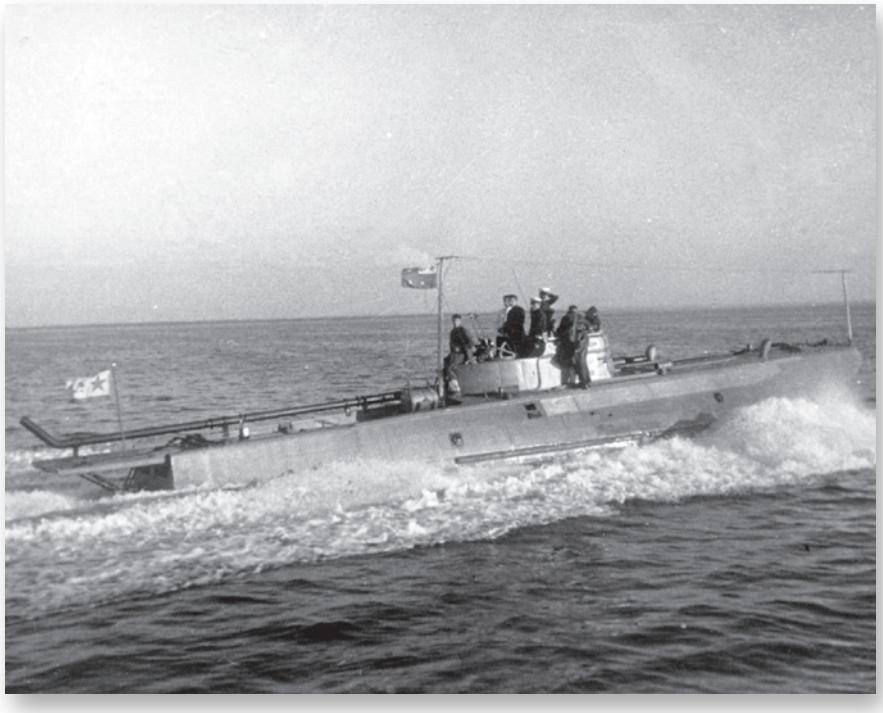
SOVIET MOTOR TORPEDO BOATS OF WORLD WAR II

PRZEMYSŁAW BUDZBON ILLUSTRATED BY WALDEMAR GÓRALSKI & PIOTR FORKASIEWICZ

NEW VANGUARD 336

SOVIET MOTOR TORPEDO BOATS OF WORLD WAR II



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SOVIET MOTOR TORPEDO BOATS OF WORLD WAR II

INTRODUCTION

The two decades spanning the 1860s to the 1880s witnessed significant technological innovations that, at the time, may not have been fully appreciated but would later have a profound impact on the development of the motor torpedo boat (MTB). They were the invention of the self-propelled torpedo, the use of a petrol engine to power a boat and the design of the stepped, flat-bottomed hull which incorporated the concept of hydrodynamic lift, often referred to as planing, to reduce hull drag. The breakthrough came with the introduction of high-revolution petrol engines, which offered a remarkable power-to-weight ratio, enabling use of the planing-effect hulls. At the turn of the 20th century, the drive for increased speed in fast craft found motivation in the world of sports, most notably during the 1908 London Olympics, where powerboat racing made its debut.

English shipbuilder Sir John Thornycroft (credited as a pioneer in the torpedo-boat industry) created the Miranda series of fast boats, with the pinnacle being *Miranda IV*, launched in 1910. This boat could reach speeds of up to 35kts with a single 120hp petrol engine. The boat was characterized by its hard chine stepped hull. The forward part of the hull featured a traditional shape with a nearly vertical bottom at the bow, which gradually transitioned into a wide obtuse V amidships before a step. After the step, the V bottom became almost flat and was separated from the sides by an angled step, known as a 'hard chine'.

Miranda IV represented a true modern single-stepped hydroplane, where the transom effectively acted as a second step or planing surface. These stepped hydroplanes, also known as skimmers, proved to be significantly more efficient than conventional planing hulls, offering nearly a 40 per cent speed advantage with the same weight-to-power ratio. At that time, a speed of 35kts for a small boat was unimaginable. Thornycroft made quite a sensation on a run with *Miranda IV* at full speed down the Thames, past the Houses of Parliament.

The development of the CMBs, 1915

In the summer of 1915, officers of the Harwich Striking Force suggested the possibility of using small fast boats carrying only a single torpedo to go over the protecting minefields and attack German ships in their bases. With the experience of *Miranda IV*, the designers of the Thornycroft Marine Motor

Department were confident in the feasibility of fulfilling these requirements on the weight limit given. The only condition was to avoid the fitting of the typical heavy bronze torpedo-tube with a normal firing gear. The torpedo alone weighed 750kg so it accounted for most of the deadweight of a hull of this size. The solution was to fire the torpedo tail-first when the boat was at full speed, aimed directly at the target.

The first Coastal Motor Boats (CMBs) to enter production were 40ft long, being practically a rescaled version of the 26ft *Miranda IV* with a torpedo, one or two twin Lewis MGs and two or three crew. The hulls, as in sporting craft, were built of single or double mahogany. They were powered by one 250hp Thornycroft or Fiat engine via a cone clutch coupled with a single shaft supported by three brackets, the last one protruding beyond the stem and integrated with a rudder. Later, a 55ft type with two torpedo troughs was developed, and from 1916 the CMBs operated off the coast of Flanders, commanded by young officers, nicknamed the 'Suicide Club'.

A 40ft CMB with the crew in civilian clothes. This photograph is captioned as CMB.4 in Agar's book *Footprints in the Sea*. (IWM Q47655)

CMBs in Russia, 1919

The CMBs were employed by the Royal Navy during the Allied intervention in the Russian Civil War, due to the feasibility of the rapid deployment of such forces and the nature of operations, which were conducted in confined and shallow waters. Two flotillas of 40ft and 55ft boats were operated by the British Dvina River and Caspian flotillas, but their use, due to lack of torpedo-worthy targets, was focused on the fast transport and patrol role rather than that of the MTB. After withdrawal of the British forces, the craft of the Caspian Flotilla were transferred to the White Russian Centro-Caspian Flotilla in July 1919.

Usage in the Baltic had initially been restricted to secondary duties. Two 40ft boats under Lieutenant Augustus Agar were delivered in the spring of 1919 to a small Finnish anchorage at Terrioki, deep inside the Gulf of Finland and close to the border with Bolshevik Russia. Thanks to their speed and low draught, the boats were to be used to ferry British agents back and forth from Petrograd (later Leningrad, modern St Petersburg), with overnight cruises over the booms and minefields which protected the approaches to the city. When an anti-Bolshevik rebellion occurred in the Krasnaia Gorka fort in the vicinity of Kronshtadt, an attempt was made to support the insurgents on 17 June 1919 with CMB.4 sinking the Bolshevik cruiser *Oleg* that was bombarding the fort. The motor boat went unnoticed, which led the Russians to believe that the cruiser was torpedoed by a seaplane or submarine. The success of the mission prompted Rear Admiral

Tornikroft No 2 (note Russian spelling of Thornycroft) named *Burnyj* in the Black Sea *c.* 1925. In August 1929, it was fitted experimentally with radio-control apparatus. (Marek Twardowski collection)

Tornikroft No 3 named *Bedovoj* at speed, with the Black Sea Fleet *c.* 1925. In January 1932, it was relegated to being a motor launch of naval aviation forces as VS-27. Both photographs were taken from a photo album offered to Kliment Voroshilov, friend of Stalin's, then People's Commissar (equivalent to Minister) for Military and Naval Affairs. (Marek Twardowski collection)

Walter Cowan to launch an attack on the Bolshevik ships anchored at Kronshtadt. He organized a flotilla consisting of seven 55ft CMBs. The boats, headed by Agar on CMB.4, attacked ships of the Bolshevik Active Squadron at Kronshtadt at midnight on 18 August. The submarine depot ship *Dvina* (ex-cruiser *Pamiat' Azova*) was sunk and the battleship *Andrej Pervozvannyj* fatally damaged, while the dreadnought *Petropavlovsk* was also struck, probably not with a direct hit at her bow but by shock caused by the explosion of a torpedo hitting the nearby mole. Immobilization of the Active Squadron at a cost of 24 men lost (15 KIA, nine taken prisoner) and three CMBs sunk was an outstanding success and made an unforgettable impression on the Bolshevik commanders. This action was to shape Soviet naval strategy for decades to come.

The remains of CMB.62 were raised on 13 September, which, combined with captured documents and statements made by prisoners, revealed details of the vessel's construction and tactics. When, in May 1920, the CMBs were captured from the White Russians, the Bolsheviks were already fully aware of the combat capabilities of these boats. They then kept them in naval service to conduct operational and tactical tests.

TORPEDO BOAT DEVELOPMENT

The Soviet 'Young School'

In 1922, questions regarding the future role of naval forces in the Soviet Union were raised by students of the Naval and Maritime Academy, freshly returned from the front lines of the Civil War. Drawing from their first-hand experiences, they enthusiastically utilized Marxist–Leninist ideology to challenge the established principles of naval warfare. They labelled the senior lecturers of the academy as their opposition, calling them the 'Old School'.

In contrast to the conventional approach, the students advocated the concept of a 'little war at sea' and creatively adapted it to suit their own objectives. Identifying themselves as the 'Young School,' they believed that the prevailing economic conditions made it unfeasible to construct a fleet centred around battleships. The idea of numerous fast attack torpedo craft sending the British battlefleet approaching Leningrad to the bottom of the Gulf of Riga was extremely appealing to them. Their inspiration was drawn from the accomplishments of the Kaiser's submarine fleet during World War I, and they were particularly impressed by the successful British CMB attack on the Kronshtadt roadstead in 1919. Incidentally, this was a pure 'copy and paste' of the strategy of the Russian Imperial Navy, which had built over 100 torpedo craft (*minonoski*) in the late 19th century. Additionally, the 'new' concept held allure because the emerging Red naval commanders sought rapid promotions to higher ranks. They recognized their lack of expertise in commanding battleships, cruisers or squadrons, and found commanding smaller divisions

consisting of light forces such as destroyers, submarines and MTBs to be a more manageable path, providing them with greater opportunities to showcase their capabilities and advance to more senior positions.

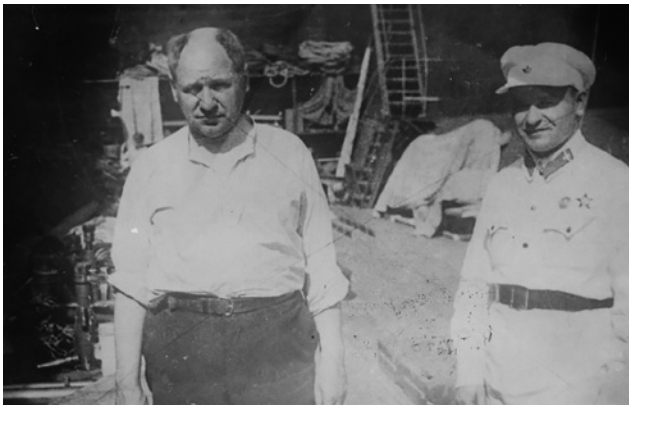
Pervenets

Shortly after inspection of the remnants of CMB.62, the Revolutionary War Soviet of the Baltic Fleet requested immediate commencement of local boat construction. Nevertheless, three significant challenges presented themselves. First, acquiring the appropriate materials for the boat's hull was crucial, as the mahogany used in CMBs was not accessible in Russia. Secondly, there was a lack of high-speed petrol engines. The final challenge was unfamiliarity with the hydrodynamic lift phenomena in Russian shipbuilding, although the method was known to aircraft engineers.

Therefore, the task to build the first experimental Soviet fast hydroplane was given to TsAGI (*Tsentral'nyj Aerogidrodinamicheskij Institut* = Central Aerohydrodynamic Institute), founded by Russian aviation pioneer Nikolay Zhukovsky with a mission to lead the development of aircraft technology. The Soviet decision-makers saw such a combination of aircraft and naval solutions as progressive – like today's use of space technologies. Design and construction of an experimental fast boat was entrusted to Andrei Tupolev, an outstanding student of Zhukovsky. The boat designated ANT-1 (an abbreviation of the given name, patrimonial name and surname of Tupolev) was laid down in October 1920 and completed by November 1921, when the first trials began on the Moskva River. Like Sir John Thornycroft had on the Thames, Tupolev showed off his boat's speed, scaring walkers and fishermen with his 6m wooden boat skimming at over 40kts. It was powered by a 160hp Isotta-Fraschini V6 water-cooled aero engine. The flat-bottomed stepped hull was fitted along both sides with longitudinal sliding planes, extending to the stern and hinged around the transverse bar mounted atop of the sides just abaft the step. The angle of the sliding planes could be adjusted using a lever to study the influence of their inclination on hull resistance.

The German manufacturer Junkers' efforts to secure an order for 100 Ju-20 reconnaissance aircraft and the relocation of their factory (Germany being forbidden to develop an air force under the terms of the Versailles Treaty) from Dessau to Fili, near Moscow, provided the Russians with access to all-metal aircraft construction technology pioneered by Hugo Junkers. Tupolev took advantage of this to complete the ANT-1 by November 1923, a prototype aircraft with a duralumin structure, and a duralumin hydroplane driven by an aircraft propeller, designated ANT-2.

Prospects to start series production in 1923 of a licensed version of the US-built Liberty L-12 400hp aero engine (Russian designation M-5) seemed to remove the last obstacle to building the Soviet MTBs. The requirements issued by the naval authorities called for a 55ft CMB-type boat with a speed of 100km/h (54kts). In January 1924, TsAGI proposed a duralumin-hulled boat with a two-shaft power plant and a speed of 100km/h. Following the personal



Tupolev (on the left) in September 1935 supervising transportation of the hull of ANT-6, which required great care because of its size and light construction. Visible on the negative is a crossbar, likely made probably after Tupolev's arrest in October 1937. (Author's collection by courtesy of Boris Lemachko)

presentation of Tupolev, an order for preparation for the design and construction of the prototype MTB was placed at TsAGI on 1 April 1924.

***Pervenets* (ANT-3) specification**	
Displacement	8.913 tons full load
Dimensions	length: 16.8m pp, 17.3m oa; beam: 3.3m; draught: 0.9m mean
Complement	3
Armament	1 trough for Model 1912 450mm torpedo, tail-first launching system 1 Model DA 0.3in. machine gun on the TUR-type mounting
Machinery	2 Wright T-3M Typhoon V-12 water-cooled piston engines; 2 shafts
Speed	54kts max during trials at 1,200shp at 2,000rpm; 45kts min
Range	340 nm

A

PERVENETS AND Sh-4 TYPE

1. *Pervenets* This boat was practically a copy of the British CMB, except that the material used was duralumin instead of mahogany. The hull construction was based on aircraft technology. The request of achieving a speed of 100km/h was challenging, and not possible to attain with M-5 engines of 400hp each that were then available in the Soviet Union. Efforts were concentrated on the provision of engines of higher output and improvement of the hydrodynamic qualities of the hull. The US-built Wright T-3M Typhoon V-12 water-cooled engine was selected, a 'marinized' version of the Wright T-3 Tornado engine (575shp at 2,000rpm) purchased in large numbers by the Soviet Union from 1925. The hull lines of *Pervenets* (First Born) had a lesser deadrise in the V-part before the step and a smaller bend of the bottom frames compared with the Thornycroft boats. After the step, the flat bottom bent much more downwards in the aft part, and as in aircraft, the adjustable flaps were installed close to the transom. The shaft was shorter, so the propellers were placed not at the transom as in the CMB but 1.5m towards the bow. The combined conning tower and wheelhouse had a shape resembling a small aircraft cockpit. This solution was not very practical, as it was permanently wet at sea states higher than 2, so was later rebuilt by adding a splash shield on top.

Pervenets was commissioned on 12 August 1927 in the Naval Forces of the Black Sea. In 1933, it was transferred by rail from Sevastopol to Baku and commissioned on 21 July 1933 in the Caspian Flotilla. Subsequently, it was relegated to being a naval launch in August 1941.

2. *Torpednyi kater No 64* of the Sh-4 Series II. Construction of the first Soviet series-built warships was undertaken in an atmosphere of the utmost secrecy. The shipyard workshop, warehouse of duralumin sheets and engineering offices had a strict restricted access status, with a sentry on the entrance. Trials were conducted in the closed waters of the Baltic at the Morskoj Kanal between Kronshtadt and Leningrad, and in the Black Sea at the Northern Bay off Sevastopol.

The hull had a thin-walled construction, like that of an aircraft. The transverse framing with 1ft spacing was made of special duralumin closed profiles, the longitudinal stiffening consisting of stringers, the beam keel and the girder between the torpedo troughs. The hull plating was included in the strength calculations. It was built from riveted flat and corrugated (stringer plates) duralumin sheets of 3–5mm thickness at the bottom, 1.5–3mm at the sides and 1mm on the deck. The joints were sealed with lead pads and lining, while shaft brackets were stiffened with steel rods.

A total of 60 boats of this number (including the prototype) were built. Eighteen of them were transferred during 1932 and 1933 by the Trans–Siberian Railway to the Far East, where two divisions (the 1st and 4th) were formed. Of the remaining 41 (No 81 of the Series II was damaged on 13 May 1930 during trials due to the ignition of petrol vapours and subsequent fire, becoming a constructive total loss, its engines being fitted to No 32), 18 in the Baltic and 12 in the Black Sea were fitted with remote-control apparatus. On the eve of World War II, only 39 Sh-4-type boats remained in service, 20 of which were relegated to subsidiary duties (training, communication, service) before the German invasion, with seven following soon after, which left 13 to participate in combat (four of which were lost). By that time, they had been refurbished and rearmed with 0.5in. DShK machine guns.

Torpednyj kater No 64 was commissioned on 29 December 1929 with the 4th MTB Division of the Naval Forces of the Black Sea, being transported via inland waterways and railway from Leningrad to Sevastopol in 1930. In 1934, the division was renumbered as the 2nd MTB Division, so the boat changed its number to No 22. Because of wear, the vessel was relegated to use as a harbour launch in April 1937.

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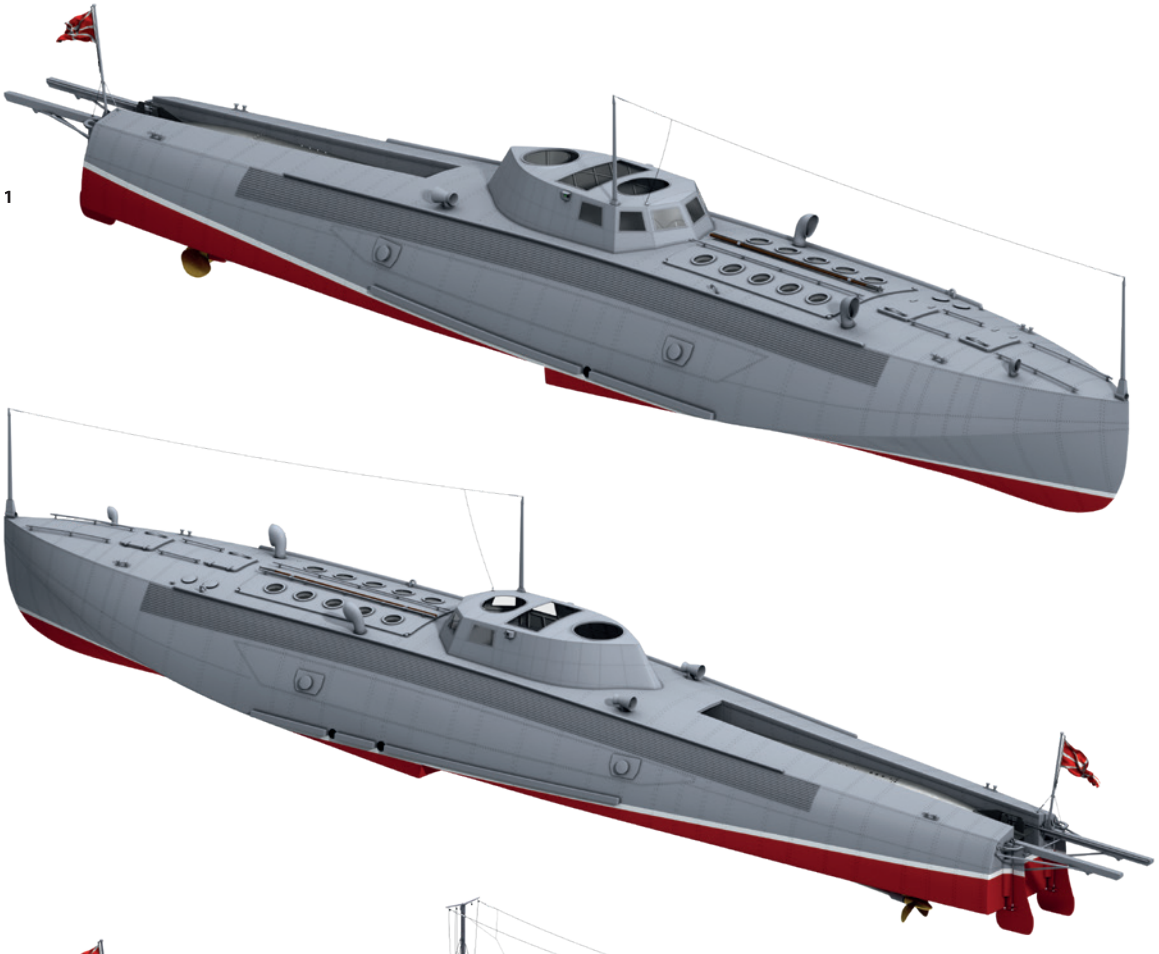

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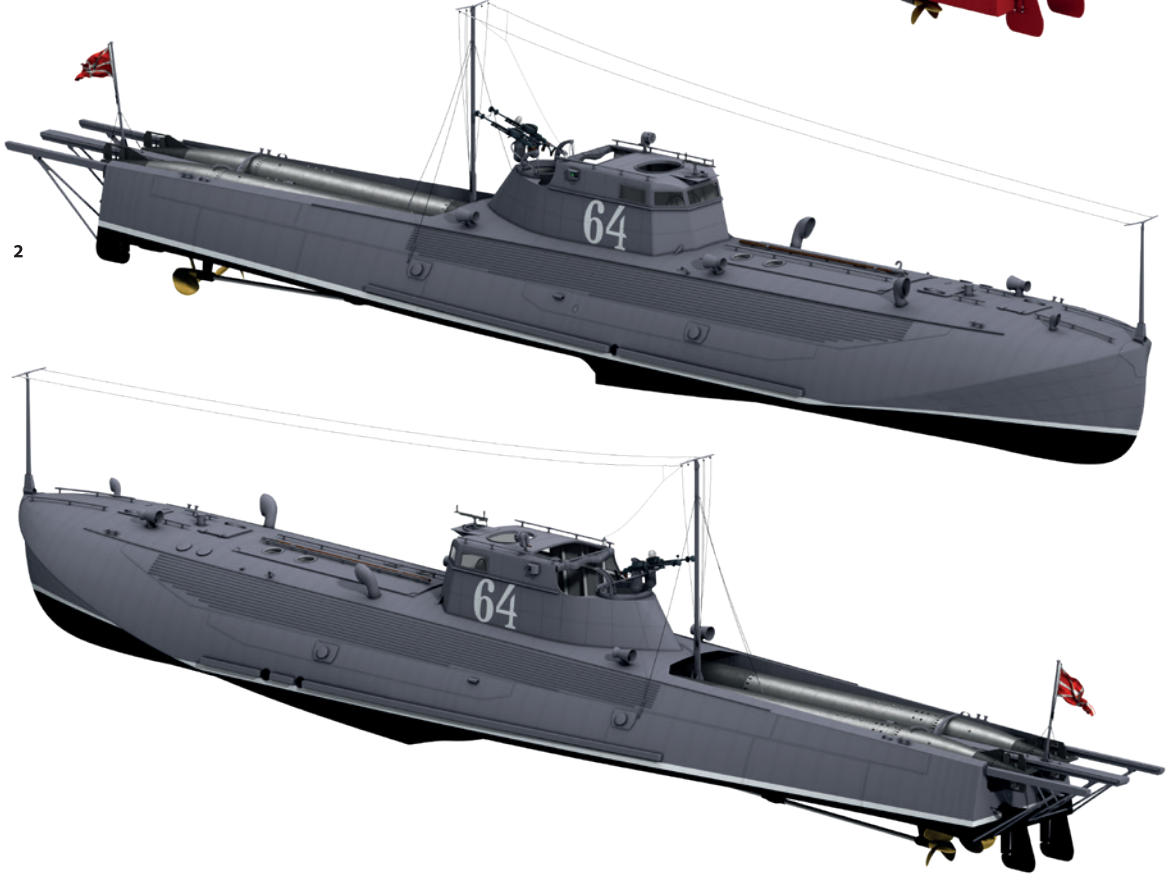
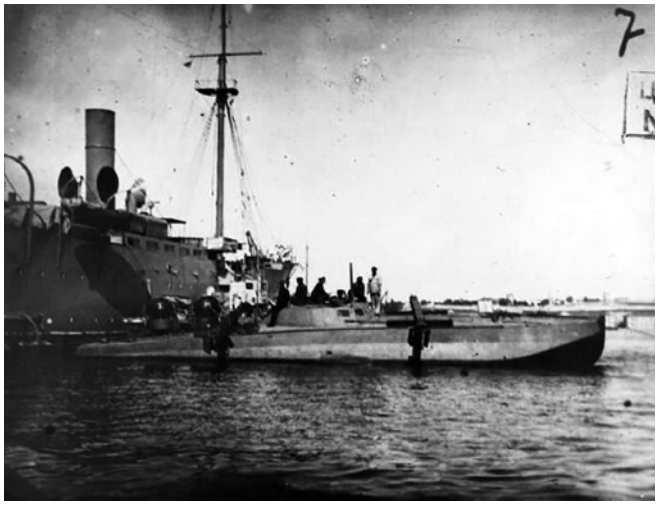


***Pervenets* construction**	
Builder	TsAGI Workshop, Moscow
Laid down	30 July 1925
Launched	14 March 1927
Completed	26 July 1927

Sh-4 type Series I specification	
Displacement	10.0 tons *normal*
Dimensions	length: 16.8m *pp*, 18.05m *oa*; beam: 3.29m *wl*, 3.33m *oa*; draught: 0.58m moulded, 0.81m max
Complement	5
Armament	2 troughs for Model 1912 450mm torpedoes, tail-first launching system 1 Model DA 0.3in. machine gun on single TUR-type mounting
Machinery	2 Wright T-3M Typhoon V-12 water-cooled piston engines; 2 shafts
Speed	48–50kts max without torpedoes, 46–49kts max full load (with torpedoes) at 1,200shp at 2,000rpm max; 1,150shp at 1,900rpm mcr
Range	300nm at 24kts, 150nm at 47kts; petrol 1,085kg

***Torpednyj kater No 64* construction**	
Builder	Workshop No 17 of the A. Marti Yard, Leningrad, Moscow
Laid down	March 1928
Launched	Spring 1929
Completed	3 December 1929

In January 1925, the requirements took their final shape: a 100km/h MTB with a range of 300nm and seakeeping up to sea state 3, armed with one 21in. torpedo in a trough and one 0.3in. machine gun; a hull divided by watertight bulkheads; the possibility of transport by rail and hauling onboard cruisers had to be provided; and a three-man crew. In January 1925, Tupolev was sent on a mission to Germany and France to gain insight into design and construction practices. The German Navy was hesitant at that time to share its secret experiments, with the weaponry being forbidden to them, but in France the Wisner company, which received a Soviet order for one wooden-hulled boat, was more willing and delivered the results of its experimental and development works.



Pervenets (ANT-3) in its fitted configuration in 1928. (Marek Twardowski collection)

The design process started on 2 February 1925, with, unsurprisingly, the design containing many elements taken from aircraft technology. For modelling dynamic loads on the hull, the assumption was made that forces acting on the MTB would be of the same nature as those for a flying boat when landing. A feature which increased the MTB's resemblance to aircraft was a small cockpit placed amidships. Five months later, construction of the hull started at the workshop of TsAGI in Moscow. ANT-3 had the honour to be the first warship

laid down in the Soviet Union, and the production issues plaguing its construction process were to be typical for almost all its successors. Further issues included a lack of suitable engines (the M-5 proved to be underpowered), which finally had to be imported, and deliveries of the designed weaponry. Delays in the development of the Soviet 21in. torpedo necessitated a re-working of the hull in the area of the torpedo trough and launching devices to adapt for a 450mm Model 1912 torpedo. A positive for Tupolev in the latter respect was that the weight of the torpedo was half of what was originally assumed in the project, as in the pursuit of 100km/h, every kilogram counted. A challenging requirement was that the hull should withstand the corrosive effect of seawater. Therefore, several railway tank cars of seawater were delivered from Sevastopol to Moscow to test various protective coatings. Despite strenuous efforts being undertaken, corrosion remained the Achilles' heel of Tupolev's boats throughout their entire life cycle.

Pervenets (ANT-3) with a spray screen fitted atop the bridge. (AC by courtesy of Boris Lemachko)

Following completion, the boat to be named *Pervenets* was loaded onto a railcar and transported to Sevastopol, where it was launched on 14 March 1927 and started trials two weeks later. Despite the armament carried, *Pervenets* was more a record-breaking hydrofoil than a true warship as it lacked numerous components, including a pressurized air system, clutch, reduction and reverse gear. Furthermore, the trials had more of a competitive nature than that of professional tests because, at the request of Namorsi (C-in-C Naval Forces) Romuald Muklevich, their programme included a race against an ex-British 40ft CMB.

For the duration of the trials, all traffic in Sevastopol Bay was withdrawn. One engine was started with a shore-based compressed air cylinder, and the mooring lines had to be cast off immediately to avoid breaking. The second engine was started by turning off the propeller while the boat was in motion. Initially, it did not reach the designed speed, which required a change of the screw's pitch and testing of several sets to get rid of cavitation (the formation of vapour bubbles). Because of the lack of an appropriate hydrodynamics tunnel, screws were tested by towing *Pervenets* with a destroyer. The final acceptance run took place on 16 July 1927, with Muklevich admiring the race. The CMB arrived with its engines already warmed up, so it initially outpaced the freshly started Soviet competitor. But after turning at the mouth of Sevastopol Bay, *Pervenets* obtained such a speed advantage that the mechanic of the outpaced CMB, accustomed to running the fastest ship in the Black Sea, rushed to the engine to check it was running correctly.

Sh-4 type

The first Soviet naval programme, called the Naval Construction Programme for 1926–32, fully reflected the views of the 'Young School' and was formally authorized on 26 November 1926. It included 12 submarines, 18 escort ships and 36 MTBs. Following the positive results of *Pervenets*' trials, construction

A blurred – but the only known – picture of *Tupolev* (ANT-4). It can be distinguished from the Sh-4 type by its blunt, not pointed, bow. (Marek Twardowski collection)

of an additional 24 MTBs was authorized, thereby increasing the number to 60 boats.

Within a fortnight of the 1926 Programme's authorization, TsAGI received the order to prepare the design of the improved MTB armed with two 450mm torpedoes , which was intended for mass production. The detailed characteristics called for an increase of dimensions to reach 10 tons displacement to increase seaworthiness up to sea state 3, an improvement of body lines to keep the boats dry, and a higher and closed cockpit. Regular naval requirements such as electrical wiring and appliances, radio-communication, navigation equipment and precise sights for the weaponry were also to be provided. Because of a lack of alternatives, the Wright T3M Typhoon engine was to be used, which prompted the requirement to decrease the specified speed to 50kts without torpedoes and 46.8kts fully loaded. The order for the construction of the prototype boat designated ANT-4 was issued in October 1927, with delivery scheduled for 1 August 1928. The prototype was to be built by TsAGI, but concerning the series production there was disagreement between the aircraft and shipbuilding industries, with neither keen to take responsibility. Finally, series production was ordered at the Marti Yard at Leningrad, but it took 18 months to launch the first boat from the commencement of work because of the project's technological complexity and lack of experience with use of aluminium alloys in so corrosive an environment as sea water. Production was to be organized with the technical assistance of Tupolev and his team.

ANT-4, which received the official name *Tupolev*, started trials on 27 August 1928, this time in a more discreet location – the small Omega Bay off Sevastopol. This was associated with Stalin's growing paranoia about secrecy, but also with changes in the subject of the trials. They no longer concerned an experimental half-racing boat but a full military programme. Attaining 50.5kts in light condition without torpedoes, the boat was officially accepted on 12 October 1928.

Torpednyj kater No 24 of the Sh-4-type Series I during a press photo session of the 4th MTB Division in the Black Sea during the summer of 1932. (Marek Twardowski collection)

Such was the pressure from Stalin, pushing unattainable targets for his first Five-Year Plan, that the first batch of five boats (Series I) was already ordered on 27 March 1928 when ANT-4 was still under construction at TsAGI. The entire event had its own [hidden political] agenda, as the ships were to be built from a budget gathered by 'voluntary' subscription from the 'Our answer to Chamberlain' fund. The subscription – in fact forced taxation of salaries – was the debut of a newly formed paramilitary

mass organization, *Osoaviakhim*. It was a reaction to a note presented in February 1927 by British Foreign Minister Austen Chamberlain (brother of future Prime Minister Neville Chamberlain), which revealed communist propaganda and interference in strikes in Britain and involvement in China, the whole affair ending with the termination of diplomatic relations between the nations a few months later. The announcement of the laying down of five motor boats was not aimed at making any impression on Britain (and did not, apparently not even being noticed), but served to ignite a war scare, as a manipulated panic created to open the way for Stalin's seizure of power. With the Soviet Union facing this fictitious external threat, it was easy to transform the legitimate indignation of the 'Left opposition' and the 'Right deviation' into treacherous agitation.

The series production started under type/class designation Sh-4 (Ш-4 in Russian). The reason for the use of 'Sh' is unclear, remaining until this day the subject of discussion by Russian historians. Suggestions include that it derived from the English word 'Sharp', or that its origin was in *Shturmovoj* (assault) or *Shassyor* (i.e. *chasseur* in French).

Construction of the boats was hampered by the hardships experienced in the Soviet production environment. Components were lacking, a striking example being the lack of shock-resistant clocks, which had to be robbed from Leyland – or MAN-produced buses in Moscow. Meanwhile, duralumin sheets delivered by the Krasnyj vyborzhets plant, aside from numerous defects, did not maintain their thickness. This, along with the lack of experience of shipyard workers, resulted in a wastage rate of 33 per cent. Furthermore, recklessness led to an explosion of petrol vapours on the second boat of Series I (No 41) in November 1928. Because of delays in the delivery of torpedo firing mechanisms, practically all boats from Series IV and V lacked their weaponry upon completion. Additionally, propulsion shafts were unbalanced, either because of poor workmanship or careless transportation and damage during assembly.

Newly completed Sh-4 boats during a press photo session of the 4th MTB Division in the Black Sea, summer 1932. All were of the Series II batch, with the exception of No 24, which was Series I. (AC)

The design of a 50kt combat motor boat with aircraft-style construction made of duralumin was an innovative engineering solution that resulted in numerous teething problems, the most troublesome of which was structural weakness. This proved that the assumption of similarity of the loads to those of a flying boat was wrong. The cavalier style of driving the boats at full speed resulted in numerous cracks in the structure and damage being caused. The boats were not seaworthy and could not operate successfully at sea states above 2, not to mention their inability to withstand their skippers' crazy riding. After one operational season, the December 1930 review of a dozen of the boats of the 1st MTB Division on the Baltic revealed a variety

of serious damage on ten of them, including structural fractures of engine foundation brackets. Only two, newly completed, remained intact. The same happened on the Black Sea, where only two MTBs avoided structural damage – the pair on board the cruiser *Komsomolet*s, which spent most of the time on their hoists.

Sh-4-class production data			
Builder: Andre Marti Yard, Workshop No 17, Leningrad			
Batch	**Completed**	**Number built**	**Fleet designation**
Prototype (ANT-4)	1928	1	1 Black Sea
Series I	1928–29	5	4 Baltic, 1 Black Sea
Series II	1929–31	24	14 Baltic, 10 Black Sea
Series III	1931–32	18	17 Baltic, 1 Black Sea
Series IV	1932	6	4 Baltic, 2 Black Sea
Series V	1932	6	6 Baltic
Total		**60**	**45 Baltic, 15 Black Sea**

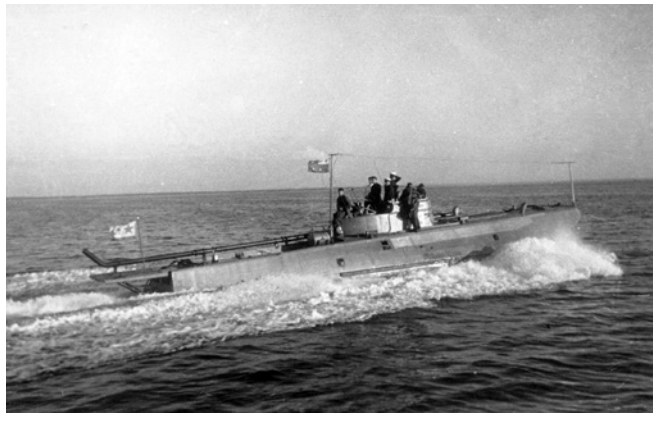
The G-5 type (ANT-5)

In November 1927, series production started of the Soviet-made 21in. torpedo (Model 53-27), which was in fact a rescaled version of the World War I-vintage Model 45-12. This offered the possibility to arm the MTBs with weaponry of double the range and with a warhead almost three times heavier compared with the Sh-4 type. The order for the new-generation MTB design was placed at TsAGI by Naval Technical Command on 18 June 1928. The project, coded ANT-5, was presented by Tupolev on 5 February 1929 and, following approval, the prototype was ordered, with delivery scheduled for 1 July 1930. To minimize change of the design on the MTB production process at the Marty Yard, the Technical Command requested standardization of the new boat with the fittings of the Sh-4 type. The boat was to be powered by two Wright T-3 Tornado engines (675hp), with the option to change to the Aleksandr Mikulin M-13 at the test phase. One request caused resistance by Tupolev: the boat was to be armed alternatively with three 45cm or two 21in. torpedoes, and the change was to be done within operational procedures. This request was caused by serious technical problems experienced with Model 53-27 torpedoes, rooted in design and workmanship flaws. Additionally, the torpedo could be adapted to tail-first firing (Model 53-27K).

Torpednyj kater No 83 of the G-5 type Series VII batch of the Baltic Fleet, photographed before April 1939, when it changed its number to No 13. Note the single DK machine gun in a canvas cover. (NHHC NH 72243)

In February 1930, construction was suspended because of lack of information concerning dimensions or weight of the engines. The decision concerning the make of the engines was only made in September, when the Isotta-Fraschini ASSO-1000 (18 cylinders, 1,000hp at 1,700rpm) was

finally ordered. They were to be delivered in aviation configuration, as the company refused to remake a naval version for only two pieces. The necessity to rework the installation caused an additional delay of nine months, so ANT-5 was only dispatched to Sevastopol on 15 February 1933. After factory trials, it was laid up for more than six months to rectify defects and strengthen construction to reduce vibration. Acceptance trials finally started in November, and the boat was accepted on 1 August 1934 after speed trials in which 65.5kts was achieved in light conditions (without torpedoes) and 58kts at full load.



A G-5-type boat of either Series VI or VII, from the 3rd MTB Division of the Baltic Fleet. Note the twin DA machine guns. The photograph was taken in the late 1930s with the C-in-C of the Baltic Fleet on board. (AC)

General arrangement

The riveted hull with closely spaced (11ft forward and 13ft aft of the step) transverse framing was strengthened as compared with the Sh-4 type. As well as stronger scantlings, the thickness of the deck plating was increased to 2mm, while the side plating received a universal 2.5mm thickness starting from the next batch (Series VII). The hull was divided into five compartments, with, looking from the bow: the forepeak with two bunks, engine room, command-radio (starboard) room with the cockpit above, a compartment for six petrol tanks and the torpedo troughs compartment. The radio room was fitted with a seat for the operator, while the commanding officer had a removable corrugated duralumin floor, a folded seat in front of the steering wheel and two steps to reach the hatch in the roof of the cockpit. Both end compartments were watertight and drained. The access to the forepeak was through the deck hatch, while the compartment under the troughs could be inspected after offloading of torpedoes, via bolted hatches. The remaining compartments were interconnected via doors (gastight in case of the petrol tanks compartment).

G-5 type Series VI and VII specification	
Displacement	11.0 tons moulded; Series VI: 14.91 tons, Series VII: 14.98 tons full load
Dimensions	length: 17.28m *pp*, 19.08m *oa*; beam: 3.33m moulded, 3.40m *oa*; depth 3.00m (from the base line to cockpit roof); draught: Series VI, 1.20m; Series VII, 1.24m max
Complement	6
Armament	2 troughs for Model 53-27K 21in. torpedoes, tail-first launching system 2 Model DA 0.3in. machine guns on twin TUR-type mounting
Machinery	2 GAM-34 water-cooled piston engines; 2 shafts
Speed	45kts max at 1,350shp at 2,000rpm max
Range	200nm at 31kts, 160nm at 45kts; B-74 petrol 1,450kg

***Torpednyj kater No 181* construction**	
Builder	Workshop No 17 of the A. Marti Yard, Leningrad & Moscow
Laid down	Autumn 1934
Launched	Autumn 1934
Completed	4 December 1934

G-5 type Series VIII and IX specification	
Displacement	11.0 tons moulded; Series VIII: 14.98 tons; Series IX: 16.50 tons full load
Dimensions	length: 17.28m *pp*, 19.08m *oa*; beam: 3.33m moulded, 3.40m *oa*; depth 3.00m (from the base line to cockpit roof); draught: 1.24m max
Complement	6
Armament	2 troughs for Model 53-27K 21in. torpedoes, tail-first launching system 2 Model DA 0.3in. machine guns on twin TUR-type mounting
Machinery	Series VIII: 2 GAM-34BP; Series IX: 2 Isotta-Fraschini ASSO-1000 water-cooled piston engines; 2 shafts
Speed	Series VIII: 51kts max at 1,600shp at 2,000rpm max; Series IX: 50kts at 2,000shp at 2,000rpm max
Range	200nm at 31kts, 160nm at 51kts; B-74 petrol 1,450kg

***Torpednyj kater No 72* construction**	
Builder	Workshop No 17 of the A. Marti Yard, Leningrad & Moscow
Laid down	Winter 1934
Launched	Summer 1935
Completed	20 September 1934

B

THE G-5 TYPE SERIES

1. *Torpednyj kater No 181* of the G-5 type Series VII. The G-5-type Series VI and follow-on Series VII were not easy to externally distinguish from their predecessors of the Sh-4 type (the change to 21in. torpedoes was not easy to see), as all the typical features were retained: a hull with part of the turtle deck forward made of corrugated sheets, the cockpit built with a step and the mast sited aft. The only apparent differences were the almost vertical ending of the slope of the cockpit, side scuttle for the radio room at midship starboard, corrugated sheets moved towards the bow, lifting points more widely spaced and inspection hatch abaft the corrugated sheets. After one year in service, 45 Series VII boats had to be re-called during 1936 to strengthen the scantlings.

Torpednyj kater No 181 (Series VII) was commissioned as No 105 on 15 December 1934 in the 5th MTB Division of the Naval Forces of the Baltic Sea, which from 11 January 1935 was named the Baltic Fleet. In May 1935, it was moved to the 3rd MTB Division and renumbered No 123. During the winter period, the boat was modified by strengthening the scantlings and recommissioned in July 1935 in the 1st MTB Division as No 181. It took over the number vacated by the Series VII boat accidentally lost a few months later. In July 1938, it was transferred via inland waterways to the Caspian Flotilla, and again in January 1944 via railway from Baku to Poti on the coast of the Black Sea. Following a short conversion, it was recommissioned in the Black Sea Fleet as a smokescreen layer. The vessel survived the war, but was scrapped afterwards.

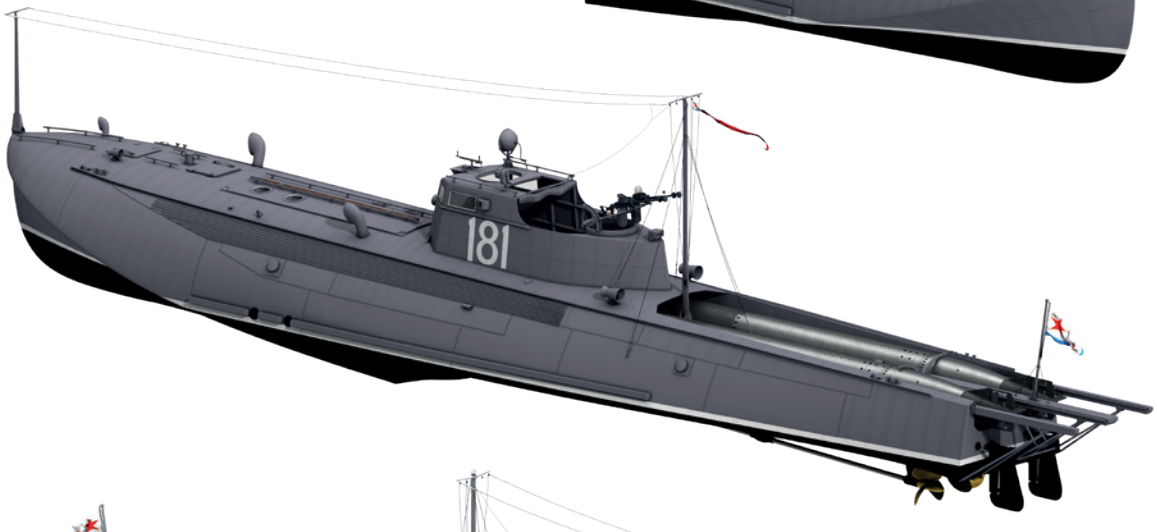
2. *Torpednyj kater No 72* of the G-5 type Series VIII. The entire Series VIII got the modified cockpit with the roof on an even level and the mast remaining abaft fixed to the longitudinal girder between the torpedoes. After replacing the 0.3in. DA machine guns with the much larger 0.5in. DShK guns, the mast was moved aft to eliminate the obstacle when rotating the barrel.

As production of the GAM-type engines did not proceed smoothly enough to satisfy the naval requirements, it was decided to fit the whole Series IX with Italian Isotta-Fraschini W-18 type ASSO-1000 engines. To reduce vibration of the propulsion system, the propeller shafts were lengthened and seated in bearings fixed to the rudder posts. This solution, copied from the CMB, was not repeated in the later batches.

One of the Series IX was experimentally converted (Project 157) to test the application of the drop-collar BS-2 torpedo launchers. After the experiment failed, it was completed with the Series XI outfit.

Torpednyj kater No 72 (Series VIII) after completion was transported more than 7,000km by the Trans–Siberian Railway and then by cart to the village of Kokuy on the banks of the Shilka River (a tributary of the Amur), and finally to Khabarovsk on a barge. It was commissioned in the 2nd MTB Division of the Amur Flotilla. After the close of the 1939 navigation season, it was rebased to Sovetskaya Gavan and commissioned as No 78 with the 8th MTB Division of the Northern Pacific Flotilla. In 1944, it received its permanent number, TK-78. Surviving the war, it was scrapped afterwards.

1



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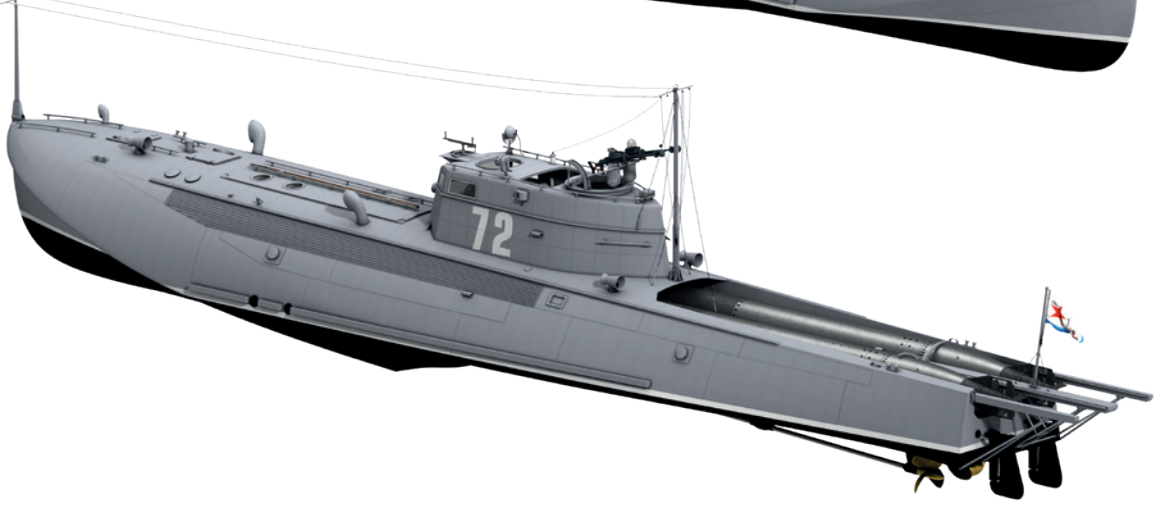


The interior of the cockpit, with the steering wheel in the centre, the CO's hatch above, engine telegraphs at the sides and a gyrocompass at the right of the centre window. (AC by courtesy of Boris Lemachko)

Operational experience with the Series VII boats proved that the strengthening of the hull was insufficient. Therefore, scantlings, engine foundations and hull plating (by 0.5mm on the sides and deck, while the bottom got the universal thickness of 5mm) were increased once more, starting from the Series VIII and, at substantial cost, retrofitted in the older batches. Some had corrugated plates replaced with a second stiffening strip, which became a standard feature from the Series X.

The cockpit, fitted forward with five windows of hardened glass, was placed above the command compartment and extended aft to provide space for the machine-gun mounting. It was fitted with a vertical steering wheel, engine room telegraphs, gyrocompass, two magnetic compasses, a stand for maps, speed table, tachometer, torpedo firing trigger, smokescreen control, inclinometer, thermometer, clock and navigation lights switch. On the roof, the commander's hatch was placed forward, with the boatswain's rectangular hatch in the middle and a machine-gun hatch with mounting aft. Forward of the commander's hatch, the KP-3 torpedo sight was placed with a folded plexi-glass screen, while the projector and hand siren were placed abeam.

The communication equipment consisted of the Shtil'-K transceiver of 20nm radius and wire aerials stretched on T-shaped folded masts: one at the bow, the second one at the torpedo bar abaft the cockpit or on the roof of the cockpit starting from the Series X. Only some of the boats were fitted this way, the others having to rely on signal flags.

Roof of the cockpit of a G-5-type boat. Note the torpedo sight at the extreme left, siren on the right, plexiglass screen in front of the commander's hatch, DShK machine gun and pilot caps of the crew. (AC by courtesy of Vitalij Kostrichenko)

The torpedo firing gear repeated the CMB solution exactly: the torpedoes were to be carried in troughs built into the aft part of the hull and fitted in the transom with a firing gear which consisted of a long steel ram ending in a bell-shaped head fitted over the nose of the torpedo. The ram was operated by gas pressure produced in an explosion vessel burning a 250g cordite cartridge. The emergency firing trigger was placed in the boatswain's hatch. The torpedo was carried on rails fitted on the sides of the trough in the after part of the boat and extended beyond the transom on the longitudinal beams. A stirrup attachment supported the nose of the torpedo until it was well clear of the boat, to protect the firing mechanism from hitting the transom. The boat was required to outpace the torpedo to turn and get out of its path. The firing process was not reliable, as wetness and splashing combined with negligence resulted in tarnishing of contacts and cartridges, which was

common in remote-controlled boats lacking everyday maintenance by a crew.

The engine room housed two GAM-34 engines mounted alternately: the port one forward and the starboard one aft. The reverse clutches could only be operated from the engine room, the three-bladed shafts being coupled directly via shafts. The maximum speed of 51kts could be sustained for a duration of only 15 minutes, the normal full speed of 47kts for 60 minutes, while the economical speed could be maintained for seven hours. Starting up from cold condition took seven minutes, or four minutes in an emergency. There was a large hatch fitted atop the engine room, allowing removal of the engines for maintenance. A freshwater engine cooling system was provided, with seawater to be used in emergency. The auxiliaries comprised two 250W DC generators, two batteries, one compressor and two bilge pumps of 30t/h each. To ensure silence, the engine exhausts were mounted under the waterline, which caused leakage of seawater into the engine cylinders. This went unnoticed during peacetime, when boats were laid up when not at sea, but became a problem during wartime when this procedure could not be applied in field conditions. This problem was remedied by providing exhaust pipes on the deck with an outlet at the transom and the installation of silencers. This caused a loss in speed of 2–3kts with the silencers in use.

Maintenance of a port GAM-34 engine in the engine room of a G-5-type boat. (Marek Twardowski collection)

The boat was crewed by six: a commander, boatswain (combining operation of the machine guns), radio operator and, in the engine room, an engineer officer, petty officer and motorman.

Series production

The second Five-Year Plan for 1933–37 envisaged, under pressure from Stalin, the completion of over 850 warships, including 267 MTBs. Stalin's acolytes, being closer to reality than their leader, and being afraid of their heads, decided to raise the number of MTBs by an additional 183 boats in a one-to-one trade for submarines, destroyers and escorts to keep the total intact. The fact that all the MTBs planned in the 1926 Programme were delivered added to their confidence.

However, at the time when the second Five-Year Naval Construction Plan was approved in December 1933, the new Tupolev prototype had only just begun its acceptance trials, and the mass production of the Soviet-made engines had not yet materialized. Following the failure of the M-13 engine, Mikulin started development of a new version of the naval

A Series X or XI boat, apparently during trials (note the flag). (NHHC NH 72245)

The Series XI-bis Torpedo boat No 75 of the Black Sea Fleet in 1940. Note the DShK machine gun. (NHHC NH 72242)

engine in 1932, basing it on his newly developed M-34 aircraft engine. The 675hp GM-34 engine (later designated GAM-34) was equipped with a reversing gear and freewheel sleeve, and its cooling and exhaust systems were modified compared to the aviation version. Despite it passing acceptance tests in December 1934, the pressure of the naval programmes was so high that series production began a few months earlier. The project did not proceed smoothly, however, so in 1936 it was decided to fit the whole Series IX batch with Italian Isotta-Fraschini engines.

The series production of MTBs was resumed at the Andre Mari Yard in January 1933, with both the prototype boat and the power unit still awaiting their acceptance trials. However, according to Stalinist doctrine, ambition in planning was no vice, while moderation was not a virtue. Therefore, unfeasibly tight deadlines were imposed on all the projects and the first batch of 14 boats was officially commissioned before acceptance of ANT-5 even took place. The Stalinist terror, as ever, forced the impossible to happen. The new design received the designation G-5 type, the 'G' ('Г' in Russian) originating from *Glissiruiushchij* (*glisseur* in French, i.e. 'slider'), and the first batch was designated Series VI as a continuation from the previous type.

G-5 type production data

Batch	Builder	Completed	Number built	Fleet designation
ANT-5	Andre Marti, Leningrad	1933	1	1 Black Sea
Series VI	Andre Marti, Leningrad	1933–34	25	1 Baltic, 12 Black Sea, 10 Pacific, 2 Arctic
Series VII	Andre Marti, Leningrad	1934–35	74	23 Baltic, 51 Pacific
Series VIII	Andre Marti, Leningrad	1935–36	51**	12 Black Sea, 39 Pacific
Series IX	No 194*, Leningrad	1936–37	25	25 Black Sea
Series X	No 194, Leningrad	1938	25	12 Baltic, 1 Black Sea, 12 Pacific
Series XI	No 194, Leningrad	1939	24	24 Baltic
Series XI-bis	No 194, Leningrad	1940–41	34	30 Baltic, 9 Black Sea, 1 Onega
	No 532, Kamysh-Burun	1941	6	
Project 213	No 639, Tyumen	1941–43	14	6 Black Sea, 8 Volga
Series XII	No 633, Tyumen	1942–44	31	16 Baltic, 25 Black Sea, 6 Pacific
Series XIII	No 194, Leningrad	1943–44	16	
Total			**326****	**106 Baltic, 91 Black Sea, 118 Pacific, 2 Arctic, 1 Onega, 8 Volga**

* Andre Marti Yard, numbered from 1937 ** Plus 4 boats built for Spain

Despite an increase in size and scantlings, the new construction inherited many of the earlier shortcomings. The most troublesome was structural weakness, which again resulted in cracks and damage caused by slamming.

In August 1936, the fitting of additional stiffening was ordered in 149 boats, which caused such a backlog in Workshop No 17 that no new construction could be started in 1937.

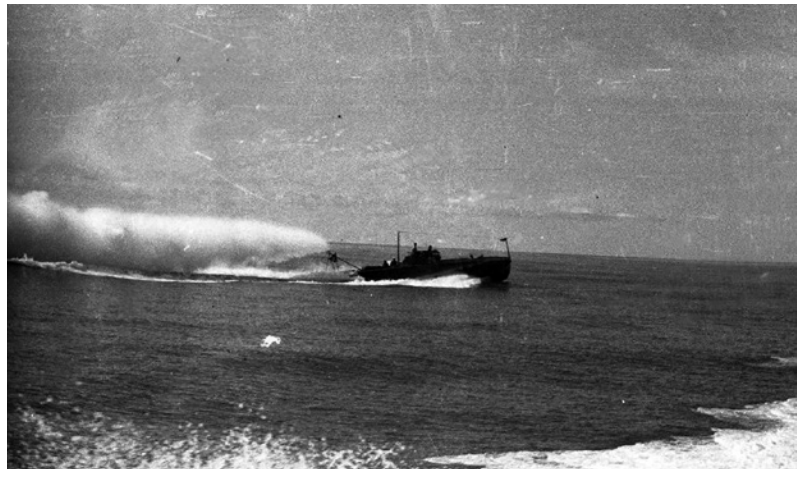
Because of the increasing overload of Yard No 194 (Andre Marti, Leningrad), occupied in building major warships under the third Five-Year Plan, it was decided in 1940 to move production of the G-5 type to lesser yards. The fishing boat builder at Kherson and the yards at Kerch (located in Kamysh-Burun near Kerch, Works No 532) and Rybinsk (Works No 341) were selected to take over the construction of the boats, designated as the Series XI-bis.

Sh-4-type boats of the 4th MTB Division preparing for exercises. The pier on the left leads to a hangar, where boats were lifted from the water. Note the water-resistant clothing and pilot caps of the crew. The mast is in its folded position on the beam, with the pipe of the smoke generator. Note also the cut-out in the deck (abaft edge of the cockpit) used for locking the mast in the upright position. The flag of the division commander is on the bow mast. (AC by courtesy of Boris Lemachko)

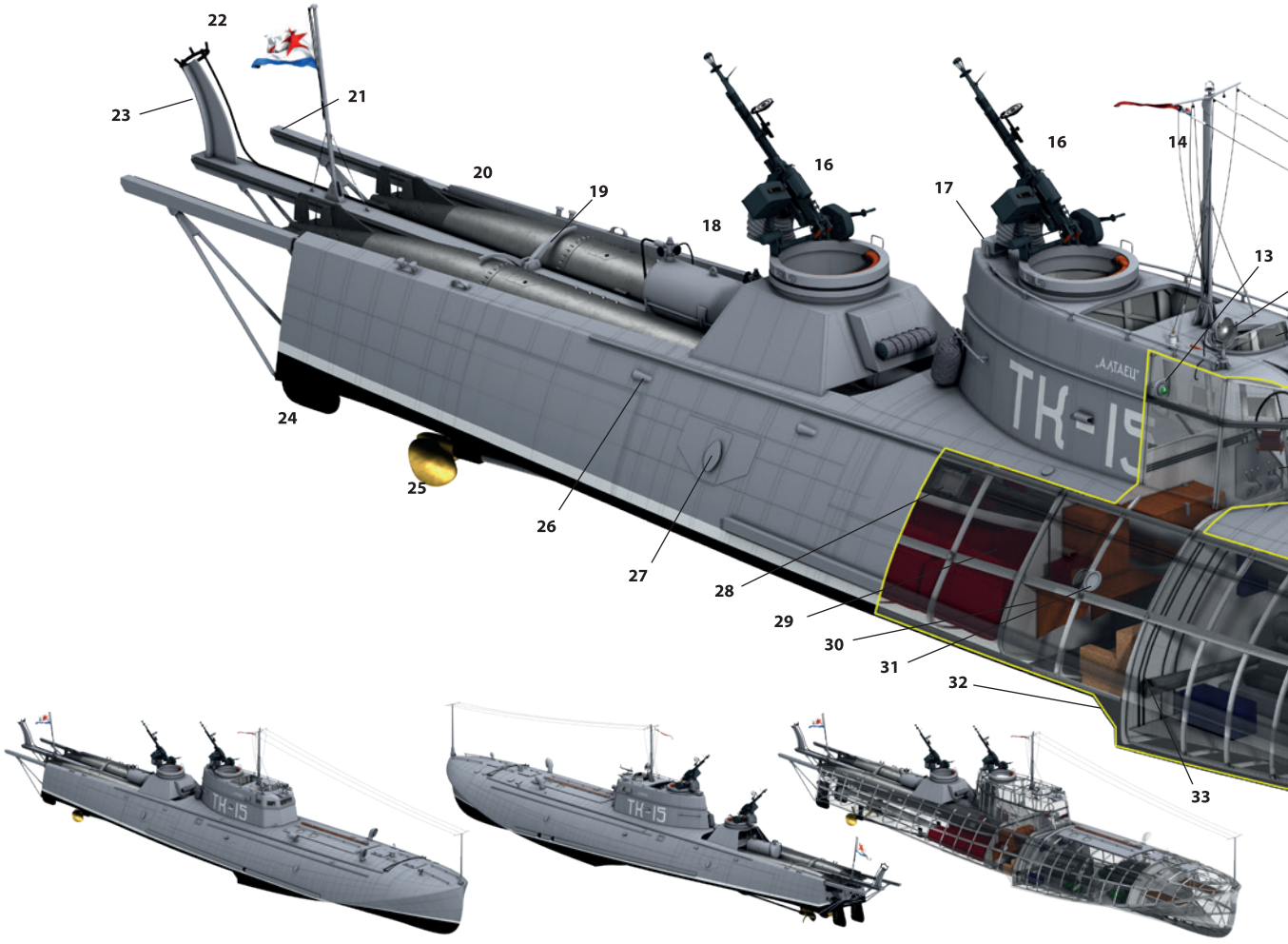
Corrosion

Duralumin does not rust or corrode rapidly in air, but it does once the metal is in contact with a liquid corrodant or moisture, especially sea spray. In such a case, duralumin is subject to intracrystalline embrittlement, causing multiple cracks in its construction. Since such issues can also be caused by fatigue stresses, the combined action of both factors accelerated the corrosion process. Moreover, excessive vibrations caused by aircraft engines and the impact of waves did not help to keep the anticorrosive coatings intact.

A preventive solution was both difficult to apply and inefficient, hampering operational use of the boats. To prevent or reduce corrosion, each part and sheet had to be covered with paint separately, before assembly, which then had to be done with care to avoid damaging the coating. The upperworks were to be primed with red lead and painted with ordinary naval grey paint. For the submerged surface, Tupolev proposed the use of Zimmerit sealant, but the yard refused as it required the heating of the coated surface to 100°C with the use of a soldering lamp. Kuzbasslak sealant was used instead, a bituminous base dissolved in an organic solvent derived from a petroleum product and to be applied without



Torpednyj kater No 24 of the Sh-4 type testing a smokescreen generator. (Marek Twardowski collection)



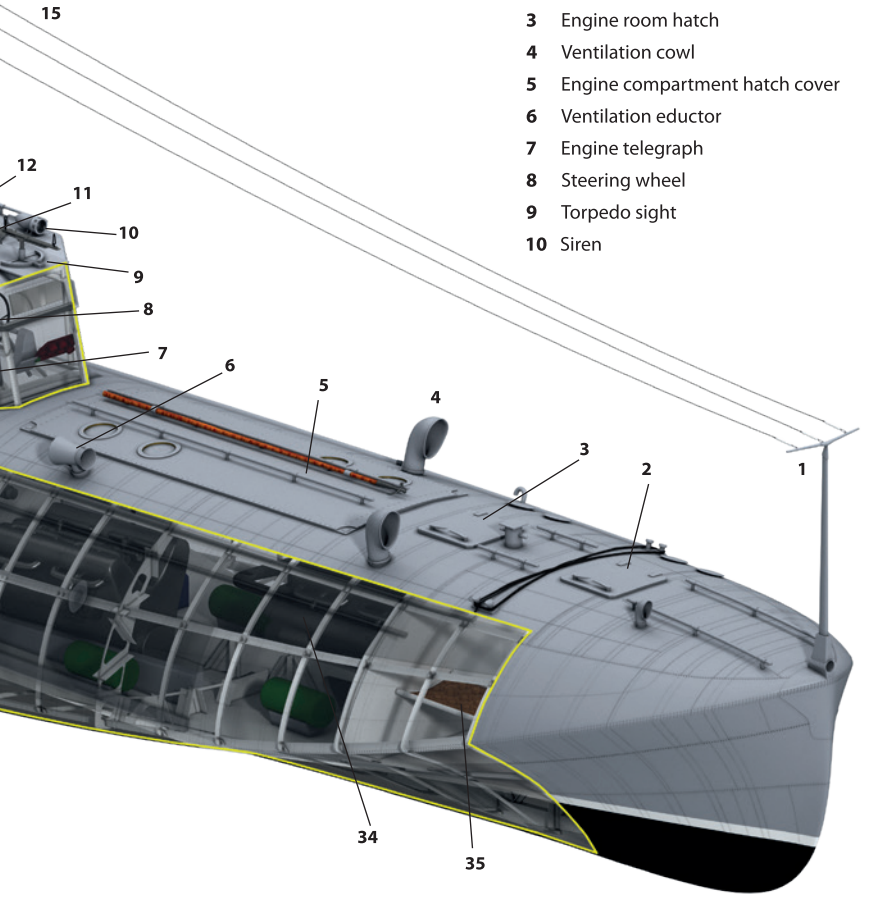
C

TORPEDNYJ KATER No 15 OF THE G-5 TYPE SERIES XI-BIS

These boats represented the epitome of Tupolev's copying of the Thornycroft CMB concept. The structural strength refined what was externally visible, with the second stiffening strip replacing the corrugated plates. The mast was moved on top of the cockpit, while a small searchlight was replaced by a large projector. From 1941, the DShK machine guns became available in some numbers, so they phased out the obsolescent 0.3in. DA guns. The experience of war fought by the 'Imperialist powers' emphasized the necessity to increase AA defence, so starting from the Series IX-bis the boats got a second DShK machine gun located on a small superstructure mounted abaft the cockpit across the torpedo troughs. They were fitted also with a smokescreen generator, mounted abaft the cockpit over the troughs. The smoke hose was led out on the centre beam between the torpedoes, ending at a curved stand at the end of the beam.

Improvement of engine construction allowed an output increase to 1,200shp per unit in the GAM-34FN version. This was achieved at a cost of fuel instability, as the highly flammable aircraft petrol had to be replaced by the more dangerous in-use petro-ethanol mixture. Production of this model was quickly phased out, while wartime shortages necessitated the substitution of the other Soviet-made models by the US-made Lend-Lease Packard engine, which enhanced maximum speed up to 56kts. The design fitted with the Packard engines had the code Project 116.

Torpednyj kater No 15 was commissioned on 12 December 1943 to the 5th MTB Division of the Baltic Fleet and was given the permanent number TK-15 on 14 April 1944. It participated in the Moonsund landing operation in Estonia from September to November 1944, the Samland offensive in East Prussia in April 1945 and the blockade of the Courland Peninsula in Latvia in May 1945. It survived the war and was scrapped in the early 1950s.



KEY

1 Bow antenna mast
2 Access hatch to the foredeck
3 Engine room hatch
4 Ventilation cowl
5 Engine compartment hatch cover
6 Ventilation eductor
7 Engine telegraph
8 Steering wheel
9 Torpedo sight
10 Siren
11 Commander's wind deflector
12 Searchlight
13 Side station light
14 Mast
15 Radio antenna
16 0.5in. DShK KM heavy machine gun
17 Rear position lights
18 Smoke generator
19 Torpedo engine starter
20 21in. torpedo
21 Torpedo guide beam with stirrup attachment
22 Smoke screen ejector
23 Ejector stand
24 Starboard rudder
25 Starboard propeller
26 Fuel tank compartment ventilation eductor
27 Boat lifting handle
28 Fuel tank compartment inspection hatch
29 Fuel tank
30 Radio cabin
31 Skylight
32 Step
33 Starboard engine exhaust outlet
34 GAM-34FN engine
35 Berth

G-5 type Series X, XI, XI-bis, XII and XIII specification	
Displacement	11.0 tons moulded; Series X: 16.26 tons; Series XI: 17.84 tons; Series XI-bis: 17.17 tons; Series XII and XIII: 16.57 tons full load
Dimensions	length: 17.28m *pp*, 19.08m *oa*; beam: 3.33m moulded, 3.40m (Series XII and XIII 3.50m) *oa*; depth 3.00m (from base line to cockpit roof); draught: 1.22m max
Complement	6–9
Armament	2 troughs for Model 53-38 21in. torpedoes, tail-first launching system Series X and XI: 2 Model DA 0.3in. machine guns on twin TUR type mounting; Series XI-bis and later: 1–2 Model DShK 0.5in. machine guns on single MTU-2 mountings
Machinery	Series X and XI-bis: 2 GAM-34F; Series XI: 2 GAM-34BS; Series XI-bi: 2 GAM-34FN; Series XII and XIII: 2 Packard 2500 W water-cooled piston engines; 2 shafts
Speed (max)	Series X: 55kts at 2,000shp; Series XI: 51kts at 1,700shp; Series XI-bis: 54kts at 2,400shp; Series XII and XIII: 56kts at 2,400shp
Range	200–255nm at 31–38 kts, 160nm at max speed; B-74 petrol (GAM F and FN type engines powered by a mixture of 30 per cent B-70 petrol and 70 per cent ethanol) 1,600–1,650kg

***Torpednyj kater No 15* construction**	
Builder	Works No 639, Tyumen
Laid down	1941
Launched	May 1943
Completed	5 October 1943

heating after priming with red lead. However, maintenance of the vessels posed a challenge. The MTBs had to be stored onshore in special enclosed, or at least roofed, facilities with good ventilation and recommended heating in the wintertime – like planes in hangars. The boats were to be launched directly for action and hauled onshore immediately after. The hull was then to be washed with kerosene and inspected thoroughly to locate delamination of the Kuzbasslak or corrosion spots, which had to be removed without scraping and covered with paint and sealant. The closed profiles of the stiffening structure were not available for inspection, thus making maintenance impossible.

For repairing the duralumin, appropriate tools and qualified personnel were required, which were not available during field conditions. Consequently, steel had to be used for overlays and patches, which increased susceptibility to corrosion.

Remote control

Efforts to introduce remote control to MTBs were especially exciting for the 'Young School' proponents, as it offered the possibility of mass and loss indifferent striking capability, that is it increased the scale of attack by using a larger number of remotely controlled boats, thus eliminating the loss of life. It also sounded progressive. Already in August 1932, the Sh-4 boats of the 1st MTB Division on the Baltic and the 4th MTB Division on the Black Sea were equipped with telemechanical devices controlled by operators located in an aircraft. The G-5 type boats were fitted in the same way. The system performed exceptionally well during manoeuvres in 1937 in the western part of the Gulf of Finland, where 50 boats attacked an 'enemy' squadron of battleships from three sides, laid smokescreens and launched torpedoes. This was similar to the robotic war concept advocated by Tukhachevsky. The futurist vision of swarms of fearless Red robotic motor boats sinking capitalist battleships and cruisers seemed within reach.

FURTHER DEVELOPMENTS

Despite strenuous efforts, Soviet industry was not able to develop MTBs with hull constructions of steel or wood. Therefore, the design and technology developed by Tupolev monopolized the mainstream of further development. Yet in 1929, conceptual works started on attempt to develop an MTB flotilla leader type, which received the designation ANT-6.

No information about the ANT-7 design has been preserved, but apparently construction of the prototype was not initiated. The follow-on design was developed in 1935, and the prototype numbered ANT-8 was laid down in March 1938 at the TsAGI workshop. It was a substantially larger (31.3 tons standard displacement, capable of 52kts) copy of the G-5 type, able to operate at sea state 5 conditions. However, a few weeks before its launch, Tupolev and the whole directorate of TsAGI was arrested by the NKVD on 21 October 1937, which slowed down construction and development works. The arrests also finally led to the suspension of works on the ANT-9 (ANT-8 with a drop-collar torpedo launch) and ANT-10 (G-5 with a drop-collar torpedo launch) projects.

Series XI-bis Project 213 fire-support boats of the Onega Flotilla. Note the cockpit extension above the plated-over torpedo troughs. The extension housed rocket-launcher mountings, with elevating and turning mechanisms. Note the lack of torpedo sights. At the extreme right at the top of the photograph, the DShK machine-gun structure is seen on the boat furthest from the camera. The structure was moved aft to avoid damage by rocket exhaust. (Author's collection by courtesy of Boris Lemachko)

ANT-6 design specification	
Displacement	70 tons full load as designed
Dimensions	length: 34.86m *pp*, 36.52m *oa*; beam: 6.60m *oa*; draught: 1.90m max
Complement	30
Armament	1 triple set of Model 53-38 21in. torpedo tubes 3 troughs for Model 53-38 21in. torpedoes 1 Model 21-K 45mm gun 3 Model ShVAK 20mm aircraft guns 1 Model DA 0.3in. machine gun
Machinery	8 GAM-34BS water-cooled piston engines; 2 shafts
Speed	50kts at 6,800shp max
Range	435nm at 28.5kts, 156nm at 56kts; petrol 1,600kg

ANT-6 construction	
Builder	TsAGI Workshop, Moscow
Laid down	1 September 1931
Launched	22 March 1936
Completed	5 June 1939

G-5 type Project 213 specification	
Displacement	11.0 tons moulded; 17.84 tons full load
Dimensions	length: 17.28m *pp*, 19.08m *oa*; beam: 3.33m moulded, 3.40m *oa*; depth 3.00m (from base line to cockpit roof); draught: 1.24m max
Complement	9
Armament	1 Model 24-M-8 82mm rocket launcher (24-salvo) 2 Model DShK 0.5in. machine guns on single MTU-2 mountings
Machinery	2 Packard 2500 W water-cooled piston engines; 2 shafts
Speed	56kts at 2,400shp
Range	255nm at 38kts, 156nm at 56kts; petrol 1,600kg

Torpednyj kater No 106 **construction**	
Builder	Works No 639, Tyumen
Laid down	1941
Launched	April 1943
Completed	5 May 1943

The official reasons for the arrest of Tupolev were characteristic, if not typical, of the Soviet Great Purge of the 1930s. To quote official documents

D

ANT-6 AND G-5 TYPE, PROJECT 213

1. ANT-6. Russians had been adhering to the principle 'the bigger, the better' for centuries. The immense Tsar Cannon and Tsar Bell are illustrative examples from the past, along with, more recently, the Tsar Bomba nuclear bomb. What they all have in common was either their unsuitability for use or the fact that they were never used operationally. The concept of a leader boat for the MTBs followed the same pattern, aligning with the gigantism trend in aircraft construction of the time. The conceptual work for the boat started in 1929, just after the ANT-4 completed trials. The design repeated the duralumin single-step planning-type hydroplane hull and combined the tail-first torpedo launch system (three troughs) with a conventional triple bank of torpedo tubes. The total of six torpedoes would make an attack possible on heavy units of an enemy squadron. Armament was to be strong enough to provide AA defence for smaller boats and cover after a torpedo attack. ANT-6 was nicknamed the '*Tsar Boat*' in Tupolev's circle.

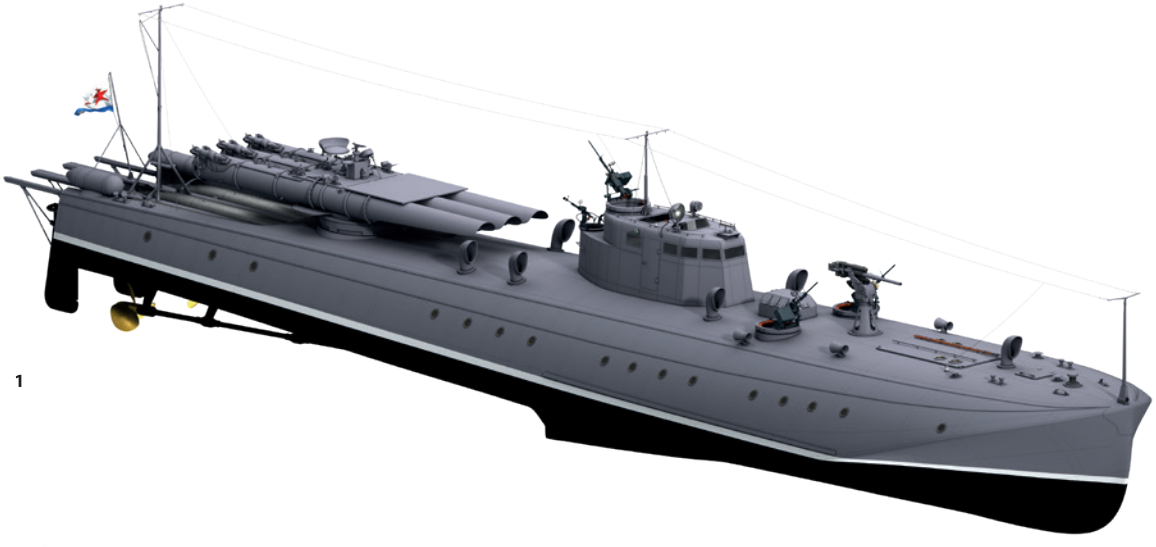
ANT-6 was laid down in 1931 and the giant hull was delivered to Sevastopol in September 1935 for the fitting of eight engines and other mechanisms. ANT-6 went for sea trials in April 1936, attaining 55.3kts at 55 tons displacement. At that time, it was already clear that the construction, designed using the same rules as the G-5 boats, required substantial reinforcement, which drastically affected the weight of the hull. The triple torpedo tubes proved to be overweight compared with the original specification, while the recoil during torpedo launch was four times stronger than expected. This posed a danger to the vessel's stability and increased dynamic loads on the structure, which required strengthening. In the middle of all these problems, Tupolev was arrested, which further hampered works.

The boat was commissioned in the Black Sea Fleet on 20 June 1939 under the designation G-6, without the triple bank of torpedo tubes and 45mm gun, having instead one 0.5in. DShK and three 0.3in. DA machine guns plus three torpedo troughs, with 86 tons displacement. Under these conditions, it attained 48kts during a test run in 1940. Although the MTB leader concept was then abandoned, the G-6 proved itself to be satisfactory in service as a fast transport.

2. *Torpednyj kater No 106* of the G-5 type, Project 213. The eight Series XI-bis boats were assembled at Works No 639 at Tyumen from the parts and equipment evacuated from Kamysh-Burun and Rybinsk. Early in 1942 it became clear that in the Baltic and the Black Sea, the MTBs in their original role had lost their *raison d'être*, being employed in landing operations instead. Therefore, when production could be resumed at Tyumen, the evacuated parts were assembled as fire support craft, followed by six more laid down there. The torpedo troughs were plated over, and Katyusha M-8-M rocket launchers installed above the cockpit (the design modification was coded Project 213). The superstructure of the DShK machine gun was moved aft, to prevent damage from the rocket exhaust. The second DShK was mounted in the forward hatch.

The first eight boats were fitted with GAM engines and commissioned in the Volga Flotilla in November 1942. When ice conditions allowed, they were transferred to the Onega Lake Flotilla in January 1943. Following cessation of hostilities on Lake Onega, the flotilla was disbanded, the boats being transferred in August 1944 to the Baltic Fleet. Their rocket launchers were removed and torpedo armament installed, which reflected the change in operational conditions. The latter six vessels were fitted with Packard engines and commissioned in the Black Sea Fleet.

After completion, *Torpednyj kater No 106* was transported to Poti and received the name *Moskovskij remeslennik Trudovykh rezervov* (Moscow artisan of Labour Reserves) upon its commissioning in the Black Sea Fleet on 11 June 1943. It was detached to the Azov Flotilla and took part in the Kerch-Eltigen landing operation during November and December 1943. Returned to the Black Sea Fleet, it got its permanent number, TK-412, and participated in the Crimea assault operation in April and May 1944. Transferred to the Danube Flotilla in April 1945, it survived the war but was scrapped afterwards.



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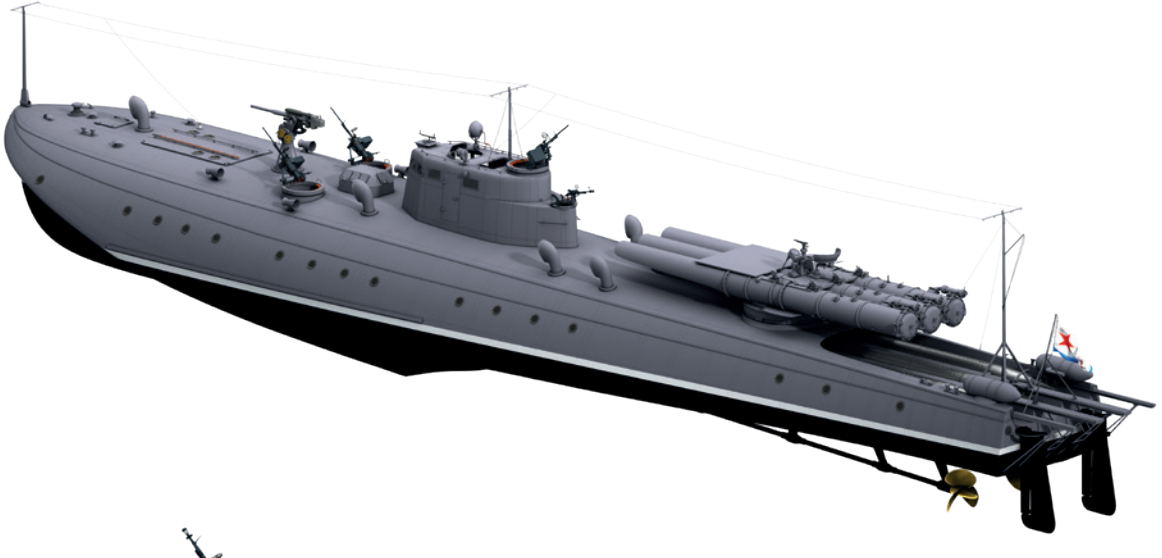

2

RIGHT
Series XII/XIII boats presenting their twin DShK battery. TK-125 is in the foreground and *TK-15 Altaets* in the background, with their numbers deleted by the censor. (AC by courtesy of Jerzy Miciński)

FAR RIGHT
Torpednyj kater No 13, the prototype of the Komsomolets class as completed. (AC by courtesy of Boris Lemachko)

of the time, he was accused of 'leading a subversive anti-Soviet organization in the aviation industry and, both personally and through accomplices, conducting subversive activities aimed at weakening the defence capabilities of the Soviet Union. In addition, Tupolev had been an agent of French intelligence since 1924'. The official accusations were only a cover, however. In the case of a person of his calibre, Tupolev's accusers would have needed the consent of Stalin, who was apparently persuaded to make the accusations by Tupolev's competitors. It was easy to accuse him: not all of his projects had been 100 per cent successful as in the case of the structural strength of the MTBs – and 100 per cent was required by Stalin, even though he did not understand the principles of technical development. Many of his colleagues were executed, but Tupolev himself was imprisoned, and in 1939, he was moved from jail to a *sharashka* – an elite labour camp which was in effect the design and construction bureau of the NKVD, operating in closed and guarded accommodation – where many surviving former TsAGI employees had already been sent to work. Tupolev was given the freedom to request the rescue from forced labour camps of his colleagues or other experts he could vouch for. He organized the design team, whose greatest achievement was the development of the Tu-2, the twin-engine front-line bomber aircraft, inspired by the German Junkers Ju-88. This earned Tupolev his release, but full rehabilitation was to come only in 1955, after Stalin's death.

The jailing of Tupolev and part of the TsAGI team caused a slowdown in construction of the new MTB prototypes. They ran trials in 1939, and while the white elephant concept of the ANT-6 was abandoned, the ANT-8 turned out to be successful and was found suitable for mass production under the designation G-8.

Works No 194 (the new name of the Andre Marti) at Leningrad was already in the process of refitting its production line at Workshop No 17 to the G-8 type, but the project was cancelled in September 1940 by the People's Commissar of the Navy, Admiral Nikolai Kuznetsov. The reason for this decision was the trial that, in May 1940, confirmed Tupolev's 'guilt'

and sentenced him to 15 years in a correctional labour camp. In making the decision, Kuznetsov knew he had some aces up his sleeve – the duralumin Project 123 and wooden-hulled P-19 designs. His decision effectively sabotaged the development of the G-8 type.

The specification of Project 123 was issued in 1938 in competition with the Tupolev line of MTBs with the intention to discontinue the G-5 type, as it was seen as the design of a 'spy' and 'enemy of the people'. The design was prepared in 1939 at the construction bureau of Yard No 194 by the team headed by P. A. Taptygin, supported by the remains of TsAGI, drawing on ten years' experience with the mass production of the G-5 type. The hull construction represented a face-lift modification of Tupolev's G-5s. The hull lines were optimized to improve seaworthiness by increasing the deadrise of the stepped hull and lowering the chine line, the application of fuller lines forward and the significant turtle-back deck being abandoned. The hull was built of duralumin, with the use of open profiles of stiffeners which simplified maintenance. Steel rivets (with washers insulating them from direct contact with duralumin) were used in the heaviest loaded construction nodes. The cockpit, looking like that of *Pervenets*, received 7mm of armour. The torpedo launching tail-first scheme was abandoned in favour of the Italian type of side drop-collars, which was a significant tactical improvement. The shafts were arranged as in the Series IX, seated in bearings fixed to the rudder posts.

Torpednyj kater No 15 of the D-3 type at Polarny in 1942. (AC by courtesy of Vitalij Kostrichenko)

Nevertheless, the design was not endorsed by TsAGI, which was important for the decision-makers at the time as TsAGI's reputation was shaky. The prototype, named *Komsomolets*, attained 52kts at trials and revealed good seakeeping in sea state 4 conditions, while the torpedoes could be launched at speeds up to 40kts. The project was thus accepted for series production to start in the second half of 1941 as the replacement for the G-5 type, the only alteration required being an increase of the MGs to two.

Attempts to replace duralumin with wood for hull construction had begun in 1933 with the DTKA (*Dereviannyj Torpednyj Kater* = Wooden MTB) project, which was actually a replica of the G-5 type built with a wooden hull and having a displacement of 20 tons. Three such boats were completed in 1937 by the NKVD's Works No 5, but were scrapped after their

hulls did not withstand testing by the Black Sea Fleet. The manager of the yard paid for this failure with imprisonment.

The design coded P-19 proved to be a ground-breaking project. The prototype designated D-3 (*Dereviannyj* = Wooden) was developed during 1937 and 1938 by the team headed by Leonid Ermash at the design bureau at the NKVD's Works No 5 in Leningrad. This was a curious place, where free workers worked alongside detainees, and due to the prolonged secrecy of NKVD documentation, it is still impossible to distinguish exactly who

E

27 SEPTEMBER 1941 OFF SAAREMAA ISLAND, BALTICS

In September 1941, the Germans organized their Baltic Fleet around the battleship *Tirpitz*, to prevent any eventual breakout of the Soviet Baltic Fleet to Sweden. After devastating air attacks on the Soviet main base at Kronshtadt, the main force was recalled. Light cruisers *Emden* (Kapitän zur See Hans Mirow) and *Leipzig* (Kapitän zur See Werner Stichling) remained at Libau from 26 September to provide support for the German troops' advance on Saaremaa Island at the mouth of the Gulf of Riga (Operation *Western Storm*). The Russians were pushed back to the Sõrve Peninsula on the south-western part of the island, separated from the mainland by the Irben Strait.

Both cruisers, lying at the Lõu Inlet and screened by torpedo boats, harassed the Russian positions. So, to alleviate pressure on their troops, the Soviets decided to hamper the German ships with a mass attack of their MTBs. Making an unexpected attack on slowly manoeuvring vessels near the shore was the strength of the G-5-class boats. The problem was that the situation deviated from the ideal outlined in their Soviet tactical textbook. Firstly, there were only two major ships in loose formation and there was also space for manoeuvring their three escorting torpedo boats and one S-boot. Furthermore, there were only four MTBs available – *Torpednyj kater No 83* (Lejtenant Nikolaj Kremenskij), No 67 (Glavnystarshina (Chief Sergeant) Aleksandr Afanas'ev), No 111 (Lejtenant Boris Ushchev) and No 164 (Lejtenant Vladimir Naletov). Finally, the attack would not be unexpected, as there were German minesweepers from the 17th Minenboote Flotilla keeping a lookout.

The Soviet boats were based in a small harbour at the village of Mõntu under the command of Starshij Lejtenant (Senior Lieutenant) Vladimir Gumanenko (on board No 111). They left Mõntu at 8.30am, heading south by south-west to circle the head of peninsula, then changed course to north by north-east to target the Lõu Inlet at the western shore of the Sõrve. They were spotted by minesweepers, which immediately warned the *Leipzig*. Lookouts on the *Emden* detected the Soviet boats at 9.17am, and the cruiser opened fire from the its bow using 150mm guns at 9.19am from a distance of 10,000m, joined shortly after by fire from *Leipzig*. Both cruisers changed course to 'cross the T' of the Soviet group and engage all their guns. At 9.25am, the MTBs ran at full throttle and No 111 switched on its smoke generator to enable a covert escape. A few minutes later, the torpedoes were launched, with No 67 and No 111 targeting the cruisers while the remaining two vessels aimed for the torpedo boats. While the Soviet boats were turning back, No 83 was immobilized by a direct hit from a 150mm shell and started to sink. The crew was picked up by No 111, which escaped full ahead when it sighted a pursuing German torpedo boat.

Understandably, the dispersed torpedo attack on multiple targets at long distance and under enemy fire yielded poor results. German lookouts spotted only one torpedo track of eight launched. Upon their return however, Gumanenko claimed two destroyers sunk, with one cruiser and another destroyer heavily damaged. This version of events was to be repeated in various Soviet sources well into the 1980s – when the absurdity became glaringly evident. They eventually 'downgraded' the cruiser to an auxiliary merchant cruiser, and reduced the claims to the damage of just one destroyer. Currently, the Russians still consider the attack a success in that it forced the German ships to expend ammunition as on 29 September 1941, they had to withdraw to Gotenhafen.

A similar skirmish involving G-5s took place on 2 July 1950, when four North Koreans boats attacked a UN squadron comprising the British cruiser *Jamaica*, the sloop *Black Swan* and US cruiser *Juneau* off Chumonchin Chan. Only one boat survived radar-controlled fire from the Allied ships, and no torpedoes were launched. The sole surviving boat claimed the sinking of US heavy cruiser *Baltimore* (laying idle in reserve at the time), and the boat, carrying the number 21, was proudly displayed in the Victory Museum at Pyongyang. The name of division CO, Kim Kun Ok, was given to a submarine built in North Korea in 2023.

Torpednyj kater No 84 of the Sh-4 type following delivery to Vladivostok in the summer of 1932. The Series III boat was completed in October 1931 and commissioned in the Baltic Fleet as No 82. Note the different font style of the digits of the pennant number, apparently '4' being painted on by transfer. (AC)

worked in what conditions. Undertaking this task required personal courage, considering the previous project. With a displacement hull of wooden construction, the ability to stay at sea in Force 6 conditions and a range twice that of its predecessors, the new type was a radical departure from the small single-step-planing hydroplane MTBs. The D-3 type entered production late in 1939 before speed trials of the prototype had even started.

Late in 1940, the Soviet MTB construction programme was thus based on the following:

- wooden D-3 type already in series production at the NKVD's Yard No 5 in Leningrad;
- duralumin G-5 type with production shifted to small inland yards, to be replaced in future by the Komsomolets class;
- duralumin Komsomolets class (Project 123), with production to be started in autumn 1941.

TORPEDO BOATS AT WAR

Before World War II, the only opportunity for the G-5 type to operate under combat conditions was the Spanish Civil War, when the Soviet Union sold four boats to the Communist forces of the Republicans. They were delivered

to Cartagena in May 1937, together with command and technical staff. However, the inadequacy of their anti-aircraft defences, combined with the lack of ability of Soviet commanders and moderate Atlantic waves, prevented them from achieving any success.

During the battle of Khasan Lake against the Japanese in 1938, the MTBs of the Soviet Pacific Fleet served as escorts convoying transports and patrolling waters around Vladivostok, but without having any contact with the enemy. Due to icy conditions, the boats did not participate in the Winter War with Finland, while operations against Poland and Romania had a strictly land-based nature.

Organization

Upon their commission, the boats bore no names; like aircraft or tanks, they had only the pennant numbers, which were painted on the cockpits (boats built from funds gathered by 'voluntary' subscriptions were distinguished by carrying names instead, but often only for the purpose of ceremonial commissioning). Later during the war, the names (if given) were painted on the bow.

Pennant numbers of two or three digits were composed as follows:

- the first digit (or two first for three-digit numbers) was the number of the boat within the combat unit, which was important as the division was divided into two-boat groups (*zveno* – a term used in air forces), with the odd numbers given to the commander of each *zveno*;
- the last digit was the number of the combat unit (division).

For the purpose of numbering, the character № was used in Russia, which is the equivalent of the abbreviation 'No' (Number, but in one character). The full name of motor torpedo boat No 11 was *Torpednyj kater No 11*. The numbers were frequently changed, which reflected changes in division or flotilla organization or transfers between fleets, creating confusion with a few MTBs having the same number, one in

TK-412 of the Series XI-bis Project 213 modification with its Katyusha rocket launcher. It was commissioned in 1943 with the Black Sea Fleet as *Torpednyj kater No 106* and was then named *Moskovskij remeslennik Trudovykh rezervov*. Following service in the Sea of Azov, it was transferred to the Danube Flotilla in April 1945. (Marek Twardowski collection)

each of the fleets. A unique numbering system was introduced in 1944, when all the boats were given permanent numbers (usually their hitherto divisional numbers, if not repeated in any other fleet) preceded by the letters TK (*Torpednyj kater*).

War production

On 13 August 1941, the State Defence Committee, headed by Stalin, approved a special construction plan called 'Small combatants for the Navy', which envisaged that all efforts should focus on building more than 800 boats, including MTBs of the G-5 (133 boats) and D-3 (130 boats) types.

F

TORPEDNYJ KATER No 11 OF THE D-3 TYPE AND THE KOMSOMOLETS CLASS

1. *Torpednyj kater No 11* of the D-3 type. The D-3 type represented the third and most successful attempt to use wood as a hull construction material for MTB design. The three-shaft power plant employed a tuned version of the navalized Mikulin aircraft engine, the 1250hp GAM-34FN (FN-25 geared centrifugal supercharger and one K-4 carburettor), which entered production in August 1939. In the summer of 1940, the prototype was transported by rail to Sevastopol to run trials, and under ideal conditions (apparently without some of its fittings and torpedoes) attained the contractual speed of 48kts. The series construction of this type was hampered from the very beginning by a lack of propulsion units, as production of the GAM-34FN was terminated, so the boats were fitted with GAM-34BS engines instead. These engines were originally designed for AMGBs (Armoured Motor Gunboats) , but their robust design and reliability came at the price of power output, which amounted to 850hp per unit. Therefore, the maximum speed of the boats was no higher than 35kts in light conditions, and in practice no more that 32kts with torpedoes. This forced their employment as subchasers or patrol craft only. Wartime shortages also affected their armament, so some boats completed in late 1941 and 1942 were armed with 0.3in. ShKAS aircraft MGs or DT tank MGs. After the landing of the torpedo drop-collars, some were fitted with 20mm ShVAK aircraft cannons.

The situation changed with the availability from 1943 of US Packard 4M-2500 power units with an output of 1,200hp. Construction of MTBs was then resumed, and with three Packard engines installed the boats attained 40kts. AA defences were augmented with up to five MGs, the Northern Fleet boats having twin 20mm Oerlikon guns in addition to the DShK MGs.

Torpednyj kater No 11, after completion, was transported by rail to Murmansk and commissioned in the Northern Fleet on 16 August 1941. It sank in shallow water off Tsyp-Navolok in the Barents Sea on 20 November 1942 after a collision with patrol boat *Malyj okhotnik No 115* during minelaying operations off Kirkenes. Raised on 23 December 1942, the boat was recommissioned on 4 January 1943 after repairs. It was then damaged on 6 October 1943 off Kuvshinskaya Salma (at the outlet of Kola Bay) by German bombs which sunk the depot ship *Maiak* to which it was moored, and was treated as a constructive total loss.

2. Komsomolets class. Following the start of production of the duralumin G-5 type at Tyumen, the question of a successor project arose. In September 1942, specifications were issued for the design of a modified version of *Komsomolets*, which was given the code Project 123-bis. The design (headed by F. L. Liventsev) was of a flush-decked hull without the step, full bow lines and torpedo tubes, while the GAM-34 engines initially planned were replaced by US Packard models. Interestingly, like *Pervenets*, a flap was fitted (however, a fixed one) on the transom to increase the planing area. Construction of the prototype TK-350 was started in late 1943, and it ran successful trials at Batum by November 1944. Another four were delivered to the Baltic Fleet late in 1944 and a pair of them, TK-131 and TK-141, obtained a hit on the German destroyer Z-34 on 11 April 1945, but the warhead of the 450mm torpedo proved too small to sink a ship of that size. In total, 31 boats were built by the end of 1945, followed by 57 by 1948.

After the war, Project 123 was the only non-wooden design available for mass production, so despite the evident weakness of their torpedoes, production was continued with the cockpit replaced by a rectangular open bridge and Packard engines replaced by M-50 diesels (Project M123-bis, with 50 completed). This was upgraded by the addition of radar (Project 123K, 205 completed). They were given the NATO designation P-4 and remained in production until the mid-1950s.

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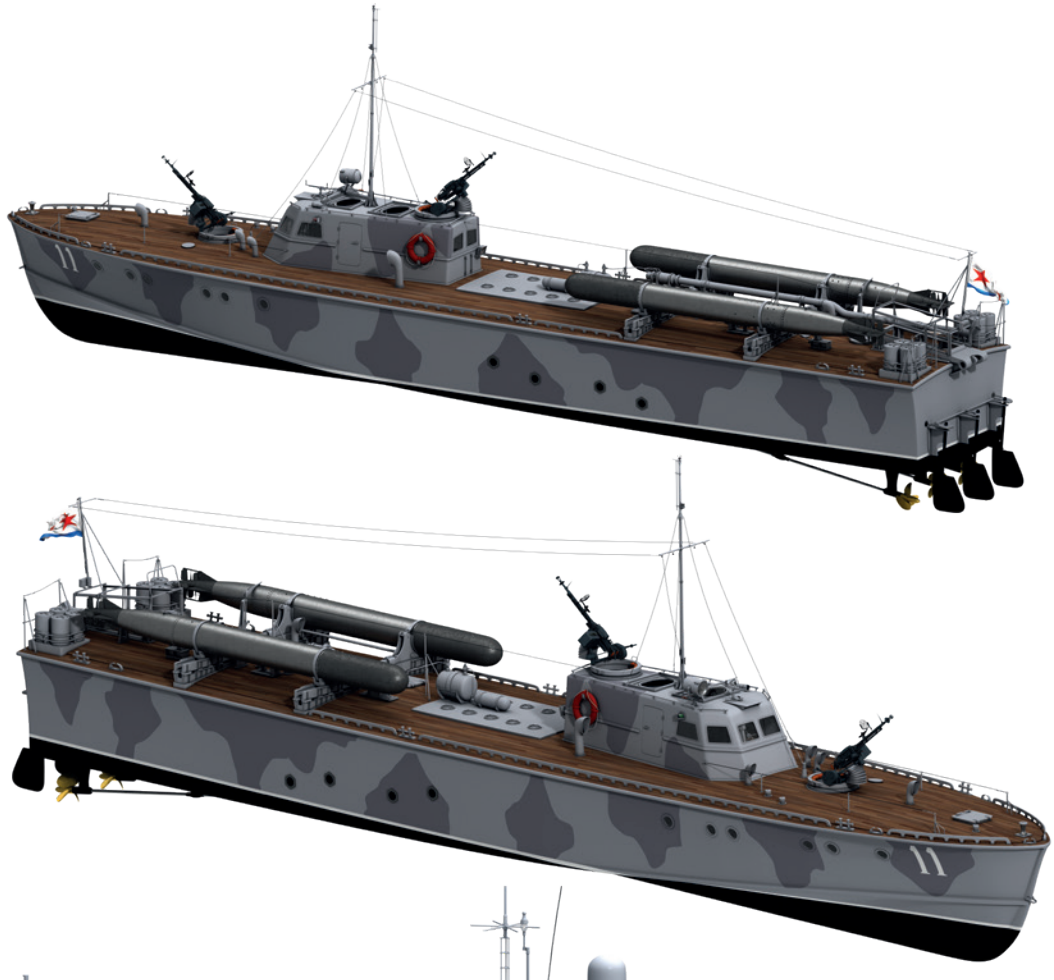

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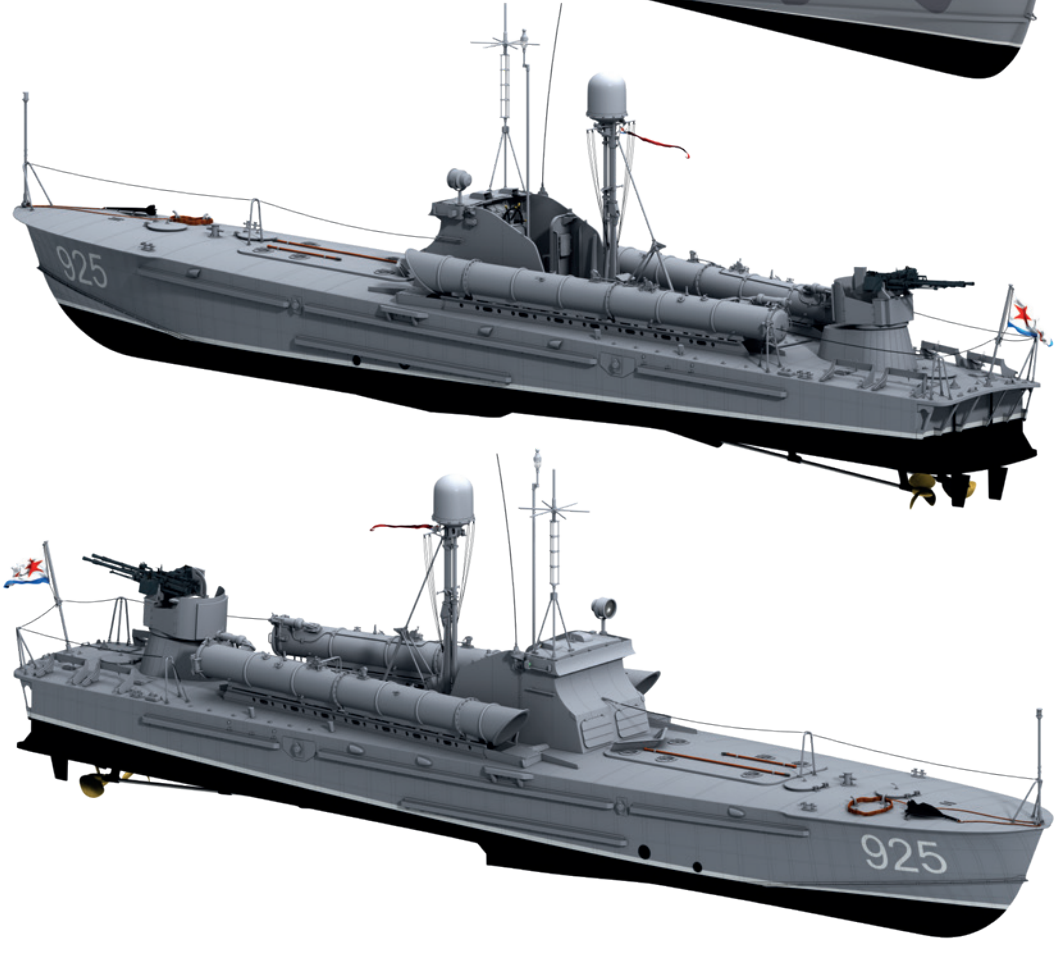


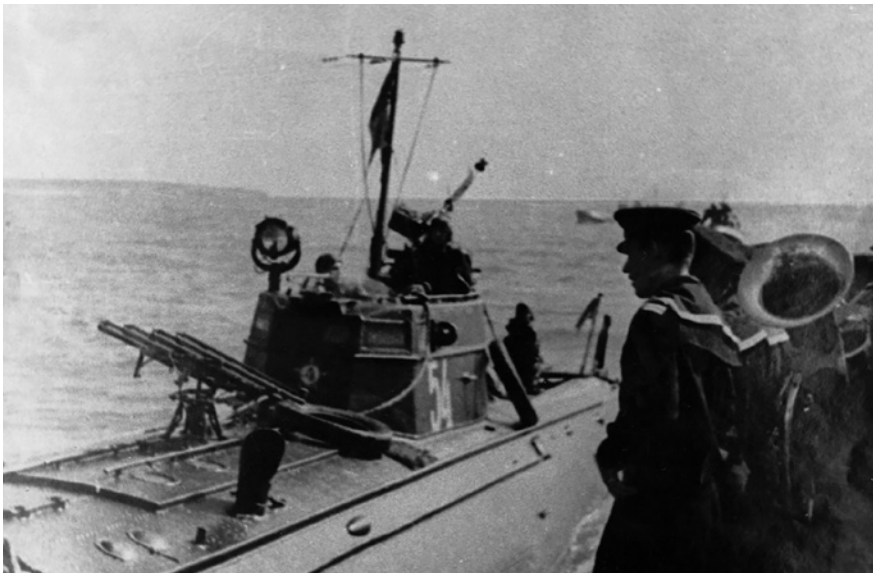
D-3 type design specification	
Displacement	36.2 tons full load
Dimensions	length: 22.20m *oa*; beam: 4.04m *oa*; draught: 0.9m max
Complement	8
Armament	2 Model BS-7 drop-collars for Model 53-38 21in. torpedoes 3 Model DShK 0.5in. machine guns on single MTU-2 mountings 1 depth charge chute, 4 Model B-1 type or 8 Model B-2 type depth charges
Machinery	3 GAM-34FN water-cooled piston engines; 3 shafts
Speed	47.9kts at 3,750shp max
Range	500nm at 16kts; fuel: 5t mixture of 30 per cent B-70 petrol and 70 per cent ethanol

***Torpednyj kater No 11* construction**	
Builder	NKVD Works No 5, Leningrad
Laid down	1939
Launched	1940
Completed	22 July 1941

Project 123K specification	
Displacement	19.6 tons standard, 22.5 tons full load
Dimensions	length: 19.30m *oa*; beam: 3.43 *oa*; draught: 0.77m mean
Complement	6
Armament	2 Model TTKA-45 single TTs for 450mm 45-36H torpedoes 2 Model KPV 14.5mm machine gun on twin 2M-5 mountings
Radar	Zarnitsa-type surface search
Machinery	2 M-50 diesel engines; 2 shafts
Speed	50kts at 2,000shp max
Range	430nm at 35kts

The rapid advance of German troops, which were occupying important industrial centres one by one, forced the Soviet leadership to evacuate some of the shipyards. Of the three selected for construction of the G-5 type, only Works No 532 at Kerch was able to deliver six boats before the town was captured by the Germans in November 1941. The parts already prefabricated, and hulls partially assembled at Kerch, were evacuated in October 1941 to Rybinsk, north-east of Moscow. Because of the advancing German threat, the whole set was moved again, this time to Tyumen 2,000km east of Moscow, where the inland shipyard was converted to military production and given the designation Works No 639. The construction of G-5 MTBs continued until 1944, with a total of 76 boats completed after the German invasion. Because of wartime shortages, some fittings were omitted or replaced by substitutes of lower parameters and quality (such as searchlights). Lack of compressors on some wartime-built boats resulted in a permanent list of 2.5°, which disappeared only at speeds over 17kts.

Production of the D-3s was hampered by lack of engines, so it was decided to complete ten hulls with only one engine and fit them as subchasers. The D-3 type design was subsequently modified in 1942 to P-19-O (*Okhotnik* = subchaser) and then in 1943 to P-19-OK (*Korektirovannyj* = corrected), with various combinations of the power plant consisting of either two Packard or GAM-34BS units and Karmington (85hp) or ZiS-5 (68hp) cruising engines. The number of depth charges carried was increased to 16, but no submarine-



The Series XI-bis *Torpednyj kater No 54* presenting its makeshift Katyusha rocket launcher. It was carried up to the end of hostilities in the Black Sea in September 1944, despite orders to dismount such devices. (Author's collection by courtesy of Vitalij Kostrichenko)

detection equipment was available. Some of the boats were armed with 82mm Katyusha rocket launchers (eight-bar type), nicknamed 'Stalin organs' by the Germans, to provide fire support during landings. The production of MTBs was resumed in 1943 thanks to Lend-Lease supplies of Packard engines by the Allies.

D-3 type production data

Completed	Project code		
	P-19	P-19-O	P-19-OK
1941	19 (7*)		
1942	6 (3*)		
1943	30	17	
1944	16	4	15
1945	3		10
Total	**74 (10*)**	**21**	**25**

* Of these subchaser conversions

The wooden-hulled D-3 type was continued in large numbers post-war under the designation TD-200, to the design modified in 1942 by the team of Leonid Ermash, at that time evacuated from the NKVD's Works No 5 to Works No 640 at Sosnovka. Only construction of the prototype was commenced before 1945, but from 1947 to 1952 a total of 167 boats were built, albeit fitted with M-50 diesel engines. They received the NATO designation P-2.

Lend-lease

The most valuable supplement to the Soviet fleet was ships acquired from the Allies under the Lend-Lease agreement. In 1943, when it became clear that Soviet industry was unable to build basic warships during the war, MTBs of the Vosper, Elco and Higgins designs were delivered. These very boats were responsible for Soviet MTB successes in the Arctic (where 14

enemy ships were sunk), but the MTB commanders were reprimanded by Admiral Kuznetsov for firing from excessive distances. During one attack on a German convoy by eight MTBs on 15 July 1944, their COs reported sinking three merchantmen and five warships for the loss of one boat. In fact, they hit nothing but the shore of the fjord.

Lend-Lease deliveries of MTBs			
Type	Vosper 73ft	Higgins 78ft	Elco 80ft
Deliveries planned	140	59	67
Delivered in assembled condition	76	55*	38
Delivered in parts	14**		29**

* 4 lost during transfer

** Assembled locally 1945/46

Some of the Lend-Lease boats were broken up in the Soviet Union after the war; the surviving boats were returned to the US in 1955, those declared unfit having been scuttled under US supervision.

Performance

On 22 June 1941, the day of the German invasion of Russia, the Soviet force of 290 MTBs, consisting predominantly of the G-5 type and a dozen Sh-4s, was organized into MTB brigades (two per major fleet), each consisting of two or three divisions of 12–18 boats. Additionally, there were detached divisions, distributed in distant areas or designated for training purposes. Half of the MTB force was allocated to the Pacific Fleet, so could not be used when hostilities began in the summer of 1941. Later, overload of the Trans-Siberian Railway with Lend-Lease supplies transported from Vladivostok reduced the possibility of transfers, so no more than a dozen boats were transferred back west throughout the war. There were no MTBs in the Northern Fleet at this time as the G-5 type was unsuitable for the Arctic and formation of MTB divisions had begun using the D-3 type.

With the German invasion came the acid test. With the enemy absolutely controlling the airspace, the Soviet remote-control apparatus was dismantled

On 12 July 1941, the German Baltic Experimental Force of around 40 landing craft and coasters steaming from Libava to Riga, was unsuccessfully shelled by Soviet costal batteries. The following morning, it was attacked by Soviet MTBs *Torpednyj kater No 17*, No 67, No 73 and No 93 under Starshij lejtenant Vladimir Gumanenko, then by naval aviation assets. The Soviets claimed the sinking of five transport ships and the damaging of a dozen others, but actually only one Pionersturmboot was sunk and a few craft suffered splinter damage. For 'victories' like this, Gumanenko received the Hero of the Soviet Union award. The Irben Strait attack is depicted in a Soviet postcard dated from the mid-1970s. (Marek Twardowski collection)

ORDER OF BATTLE OF THE SOVIET MTBS ON 22 JUNE 1941

The Baltic Fleet

1st MTB Brigade

1st Division, Hanko, Finland

No 11, 21 (Series VII); No 51, 61 (Stal'noj); No 91, 101, 111, 121, 171 (XI)

2nd Division

No 12, 22, 32, 42, 52, 62, 72, 82, 92, 192, 112, 122 (D-3) – under completion

2nd MTB Brigade

3rd Division

No 13, 23, 33, 53, 63 (VII); No 73, 83, 93, 103, 113, 123 (XI)

4th Division

No 14 (VI); No 24, 34, 44, 54, 64, 74, 84, 94, 104, 114, 124 (VII); No 134, 144, 154, 164, 174 (X); No 184 (XI-bis)

MTB Division of the Skerry Squadron

No 15 (III); No 25* (IV); No 35*, 45, 55, 65*, 75, 85* (III), No 85ii** (VI), No 95**, 105** (VII)

* laid up March–June 1941

** transferred from Arctic, recommissioned 24 June 1941

Detached MTB Division, Lepaja

No 17, 27, 37, 47, 57, 67 (XI)

Training MTB Division

UO-10, UO-11 (I); UO-12, UO-13 (II)

The Black Sea Fleet

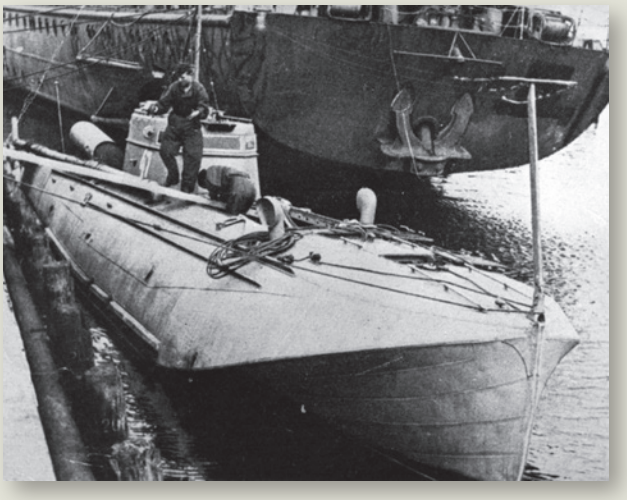
1st MTB Brigade, Sevastopol

1st Division

No 11 (VII); No 21 (IX); No 31, 41, 51, 61, 71, 81, 91, 101, 111, 121 (VIII)

2nd Division

No 12, 22, 32, 42, 52, 62, 72, 82, 92, 102, 112, 122 (IX)



The reality was quite different from that on the official posters. During evacuation of staff of the Libava naval base on the night of 26/27 June 1941, the cover force of the Detached MTBs Division was engaged by the German 2nd S-boat Flotilla, which captured *Torpednyj kater No 47* (Glavstarshina F. Ziuzin), abandoned by its crew. The boat is seen being inspected by the Germans at Libava. (AC by courtesy of Jerzy Miciński)

3rd Division

No 13 (Komsomolets); No 23 (X); No 33, 43, 53 (IX); No 63, 73, 83 (II)

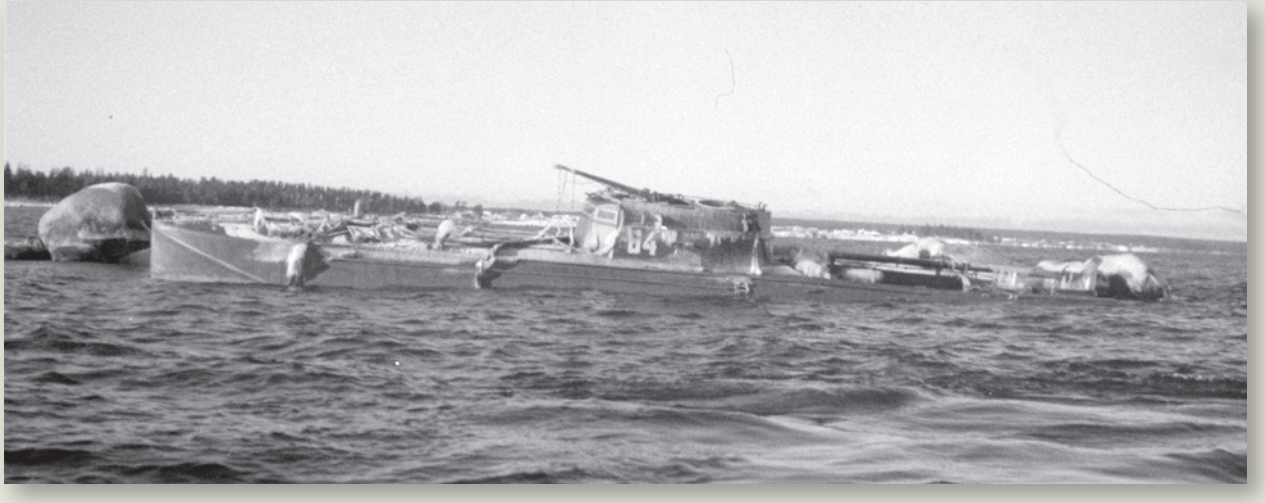
2nd MTB Brigade, Ochakov

4th Division

No 14, 24, 34, 44, 54, 64, 74, 84, 94, 104 (VI)

5th Division

No 15, 25, 35, 45, 55, 65, 75 (XI-bis); No 85, 95, 115, 125 (IX)



Torpednyj kater No 64 of the Series XI batch was stranded on 16 October 1941 off Koivisto at the entry to Vyborg Gulf and abandoned by its crew. It was found by the Finns in November 1941 and recommissioned as *Viima*, being returned upon the Soviet armistice in 1944. It was then recommissioned in the Soviet Navy as TK-70. (SA-Kuva 60540)

In the foreground, *Torpednyj kater No 64* of the Black Sea Fleet with its crew escorting Romanian prisoners, evidently following a sortie. It is a Sh-4-type Series V batch boat, with the corrugated plating reaching far aft, TUR mounting of the DA machine gun and the mast moved to the top of the cockpit. The smokescreen generator is in the lower right corner. The boat in the background carries a makeshift Katyusha rocket launcher. (Author's collection)

Detached MTB Division, Novorossiysk

No 135, 145, 155, 165, 175, 185 (XI-bis)

Detached Training Division, Poti

U 1 (ANT-5); U 1, U 2 (II), U 3 (V), U 4, U-5 (II); U 6 (V)

No 10, 20, 30, 40, 50, 60 (X); No 70, 80, 90, 100, 110, 120 (XI)

The Northern Fleet

MTB Division of the Submarine Division

No 11, 12, 13, 14, 15 (D-3) – under completion

The Pacific Fleet

1st MBTs Brigade

1st Division

No 11, 21, 31, 41, 51, 61, 71, 81, 91, 101, 111, 121, 131, 141, 151, 161, 171, 181 (XI-bis)

2nd Division

No 12, 22, 32, 42, 52, 62 (X); No 72 (II); No 82 (IV); No 92 (II); No 102, 112 (III); No 122 (V); No 132, 142, 152, 162, 172, 182 (X)

3rd Division

No 13, 23, 33, 43, 53, 63 (VII); No 73, 83, 93, 103, 113, 123 (VIII); No 133, 143, 153, 163 (VII); No 173, No 183 (VIII)

2nd MTB Brigade

4th Division

No 14, 24, 34, 44, 54, 64 (VI); No 74, 84, 94, 104, 114 (VIII); No 124 (VI)

7th Division

No 17, 27, 37, 47, 57, 67, 77, 87, 97, 107, 117, 127, 137, 147, 157, 167, 177, 187 (VII)

5th Detached MTB Division of the Northern Pacific Flotilla

No 15, 25, 35, 45, 55, 65 (VI); No 75, 85, 95, 105, 115, 125, 135 (VIII)

6th Detached MTB Division of the Coastal Defence of the Main Naval Base (Vladivostok)

No 16, 26, 36, 46, 56, 66, 76, 86, 96, 106, 116, 126 (VIII)

8th Detached MTB Division of the De-Kastri Naval Base

No 18, 28, 38, 48, 58, 68, 78, 88, 98, 108 (VIII); No 118, 128 (VII)

9th Detached MTB Division of the Nikolaevsk-on-Amur Naval Base

No 19, 29, 39, 49, 59, 69, 79, 89, 99, 109, 119, 129, 139 (VII)

Training Division

U 1 (III); U 2, U 3, U 4, U 5, U 6 (II); U 6 (VII)

The Caspian Flotilla

MTB Group of the Main Naval Base (Baku)

P 4 (ANT-3); No 171, 181 (VII)

Note: Series or type designation in parentheses; applies to all preceding numbers up to the semi-colon or the beginning of the line.

The cockpit of the Series VII *Torpednyj kater No 51*, modified by replacing the 0.3in. DA machine gun with a 0.5in. DShK gun on a MTU-2 mounting and with the mast moved to the roof. Because of the size of the gun, the MTU-2 mounting was placed higher than the TUR-2 of the DA guns, on top of the large diameter pipe. The boat was captured by the Finns in June 1944, commissioned by them as V-3 and returned upon the armistice three months laser, being recommissioned in the Soviet Navy as TK-90. (Marek Twardowski collection)

immediately, so a significant number of the G-5 type were consequently deprived of radio-communication. The crews, proving not as fearless without a remotely-controlled apparatus, launched their torpedoes from greater distances to avoid enemy fire. This did not stop the reporting of fake successes, with in the first weeks of hostilities the MTB Brigade of the Baltic Fleet claiming to have sunk the German cruiser *Köln*, one destroyer and several other ships. In fact, throughout 1941 they achieved only one

The R-1-type mines in torpedo troughs. (Marek Twardowski collection)

sinking of an enemy warship, the German auxiliary minesweeper M-1707, abandoned after being damaged by a mine and finished off by a torpedo from *Torpednyj kater No 67*. The G-5 type actually had no opportunity to act in their designated role of a mass attack on a tight enemy formation. Except on a very few occasions in 1941 and 1945, the Kriegsmarine did not operate large ships in the Baltic, and under no circumstances did the ships enter the waters of the Gulf of Kronshtadt to attack Leningrad. Neither were any large ships operated by the Germans in the Black Sea.

Consequently, early in 1942 it became clear that the G-5s had lost their *raison d'être*, being employed instead in assault operations as personnel landing craft. They had wooden benches fitted in the torpedo troughs, giving a capacity of up to 24 troops carrying light arms. To disembark them on bare shores without platforms and landing stages, the boat was to beach bow-first, then troops ran forward on the turtle deck to leap overboard. Some of

G-5-type MTB with a landing party on board. (Marek Twardowski collection)

the boats were used as minelayers, carrying up to eight small R-1 mines in the troughs or up to three large KB-1 mines on the wooden platform built on the girder between the troughs. The G-5 type often played the role of subchaser, carrying 24 depth charges in the troughs (with an additional four in the cockpit), but the lack of any listening devices nullified their efficiency. They often served as escorts as well, but to compensate for their short range they had to surrender one torpedo to make room for barrels of gasoline loaded into one trough.

Apart from the torpedoes that the G-5s had no opportunity to use, the firepower of the twin 0.3in. DA machine guns was meaningless. Applied for fleet work roles or attempting to attack German coastal convoys in the Black Sea, they could not oppose escorting R-boats or MFP landing craft with such a weapon. The replacement of DA machine guns with heavier 0.5in. DShK guns that took place from 1940 did not contribute much more effective firepower. Therefore, the war-produced boats were fitted with a second DShK mounted either on the superstructure across the torpedo troughs (Series XI-bis) or by the forward hatch. Some also had 20mm ShVAK aircraft guns fitted.

G

10 SEPTEMBER 1943, OFF NOVOROSSIYSK, BLACK SEA

The only case of a mass attack of Soviet MTBs in World War II took place in the Black Sea, but rather than Italian battleships (as in the war plans), shore defences were targeted.

Starting from March 1943, armies of the Soviet South Caucasian Front pushed the German Heeresgruppe A back from the foothills of the Caucasus, leaving only the small Kuban bridgehead in Axis hands – today, the access road there leads to the Kerch Strait Bridge. On 10 September 1943, a major Soviet offensive began against the bridgehead, part of this operation being a combined attack by the Soviet 18th Army on Novorossiysk and the landing in 130 small craft of troops of the 255th Naval Infantry Brigade in the harbour of Novorossiysk, situated inside Tsemes Bay. Planning the operation, Soviet officers came up with the fancy notion that to maintain the element of surprise for the naval assault until the last moment, torpedoes could be used instead of a traditional artillery bombardment by cruisers or destroyers. The idea of the CO of the 2nd MTB Brigade, Kapitan 2 ranga (Commander) Viktor Protsenko, was inspired by the explosions of inaccurate German torpedoes that devastated the pier at Tuapse in the eastern Black Sea. To destroy German strongpoints on the moles and along the shore, it was planned to launch 50 torpedoes.

Out of the 32 operational boats from both the 1st and 2nd MTB Brigades, 26 were designated for the operation, divided into three groups: one to enter the harbour, the second to remain outside to attack the western and eastern moles and the third to attack strongpoints along the western shore. The arrival of the assault forces was drowned out by the noise of 150 Soviet aircraft attacking the town, along with the fire of 800 guns and 200 'Stalin's organs' by the 18th Army. The shore attack groups (Kapitan (Lieutenant Commander) 3 ranga G. D'iachenko) started at 2.44am (Moscow time), while the harbour group (Kapitan-lejtenant (Captain Lieutenant) A. Affikanov) entered the port 12 minutes later after blowing up the booms. During the action, a total of 45 torpedoes were launched – 19 in the port and 26 outside. However, ten of the latter failed to explode.

The effect was devastating, but not for the German strongpoints. The quays and piers were destroyed, to the extent that they obstructed Soviet assault troops from reaching the shore. The boats containing the assault parties were not able to reach the piers, being obstructed by piles of stones and concrete blocks, so had to find other places to disembark their troops. All the while, they were exposed to the fire of intact German strongpoints, which escalated their losses. The landings were a failure and were repeated the next night, with further heavy losses.

The following boats survived: of the first (harbour) group, *Torpednyj kater No 71*, No 72 and No 73; of the second group, No 52, No 62, No 73, No 91 and No 102 at the western pier, and No 12, No 33, No 43, No 93 and No 102 at the eastern pier; and of the third group (western shore), No 22, No 42 and No 112. The losses included *Torpednyj kater No 21*, No 55, No 71, No 91, No 93, No 112, No 124 and No 125, while the fate of two boats remains unidentified. Eight boats were heavily damaged, so both MTB brigades remained with only 14 operational boats.

TK-917 of Project 123-bis in the original configuration as completed just after the war. (Marek Twardowski collection)

More than a dozen boats were adapted as fire support craft, with the torpedo troughs plated over and Katyusha rocket launchers installed. This increased their firepower significantly, as they could discharge a full salvo of rockets within eight seconds, saturating a large area. The most damaging aspect was their effect on the morale of those troops under fire, while increasing that of the sailors delivering the salvos, through the deafening roar of rockets being fired from their launchers. But the weapon, being far from precise, was not of great use against enemy shipping, though it was useful during landing operations. It became so popular in the Black Sea Fleet that numerous makeshift launchers were installed until being forbidden by the command because of a lack of safety and inappropriate ammunition distribution affecting naval logistics.

Despite the enormous number of 250 enemy ships claimed to be sunk by the Soviet MTBs, in truth they accounted for no more than 30, less than 30 per cent of those by boats of the G-5 type. The Soviet system, in particular the Stalinist one, did not permit failure, so sinkings were dutifully reported by boat commanders to assure their personal safety. At sea, there remained afloat no material evidence of victories (unlike on land with destroyed tanks or wrecked aircraft), so such claims were particularly tempting. The biggest warship sunk with the assistance of the G-5 type was actually the Soviet's own gunboat *Krasnoe Znamiia*, torpedoed in November 1942 by the Finnish Thornycroft-built *CMB Syöksy*, assisted by two ex-Soviet G-5s captured a year before by the Finns.

In return, Soviet MTB losses totalled 147 boats, comprising seven of the Sh-4 type, 95 G-5s, 33 D-3s, two Komsomolets-class vessels, nine Lend-Lease boats and one SM-4 experimental boat. This equals the total number of MTBs the Soviet Union had in European waters at the launch of the German invasion, meaning in essence that this force had been completely annihilated.

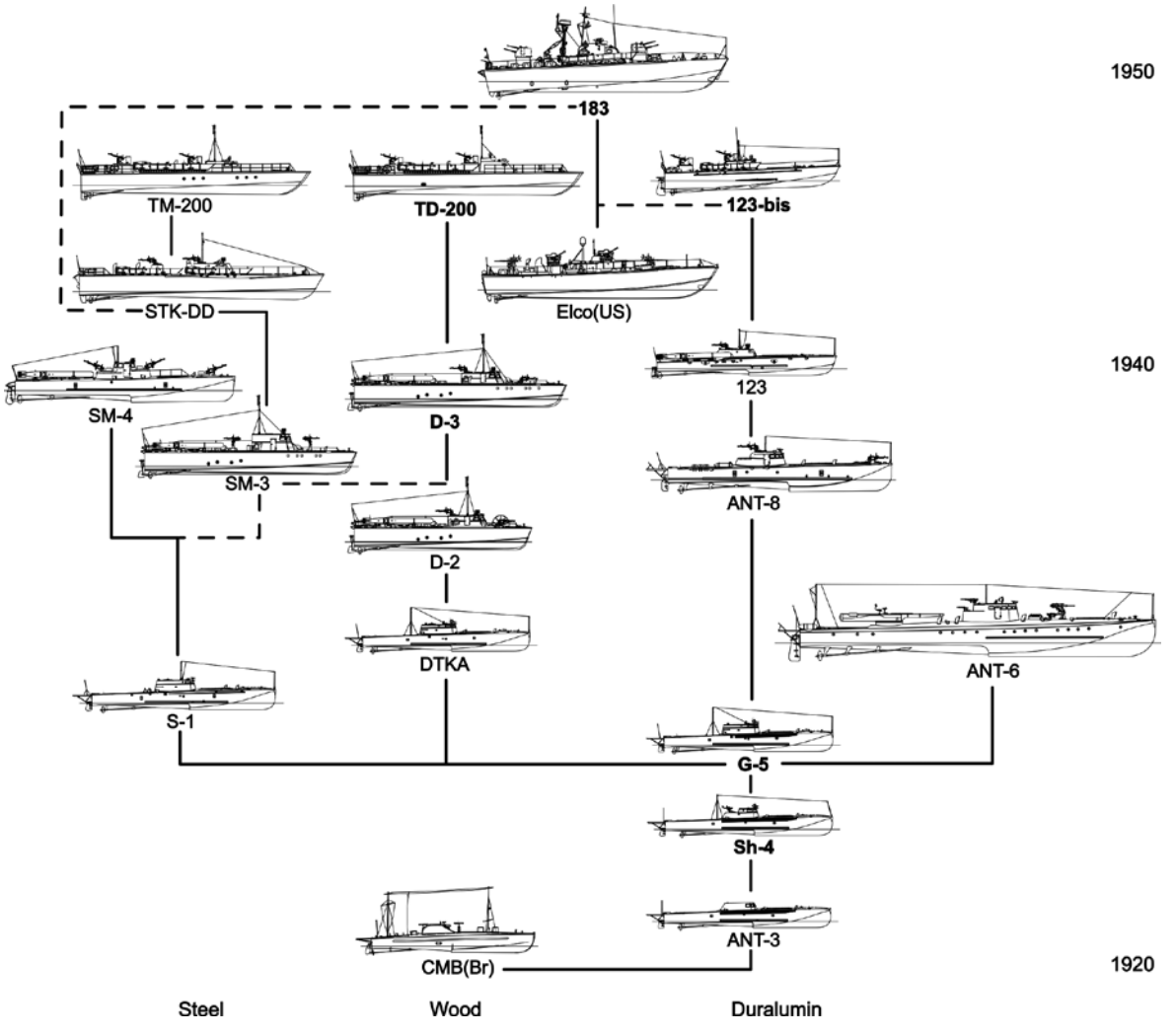
CONCLUSION

Both the Thornycroft CMB concept and Agar's daring adventures shaped Soviet naval developments for three decades. The single-step 'skimmer' was copied by Tupolev with the use of duralumin, resulting in 386 Sh-4- and G-5-type boats being built between 1927 and 1945, followed by 338 Komsomolets-class vessels from 1945 to 1955, which brought the total number of duralumin MTBs to 724.

The last batches of boats of the G-5 type were technically refined, corrected, specialized and contained sophisticated weapons, but as often happens, they fought in a war for which they were not designed. Their mission was intended to be a sudden and *en masse* high-speed attack on a tight formation of enemy ships entering relatively calm waters, such as are found in the Gulf of Finland or Gulf of Sevastopol. Instead, in areas dominated by enemy aircraft, they operated as naval workhorses, used for escort duties, transportation and assault troop landings, and were not kept in ideal dry conditions, as previously planned. The tasks they accomplished were not planned at all, while the boats themselves were poorly maintained and manned by unmotivated crews.

The *idée fixe* of Soviet naval doctrine (albeit based on the earlier Russian one) was the 'inter-theatre manoeuvrability' of light craft and small numbers of combatants via Russia's inland waterways or railway system. The Trans-Siberian Railway, inter-connected with the tributaries

TK-1044 of the Bol'shevik class (Project 183) presenting its wide beam. (AC by courtesy of Vitalij Kostrichenko)



The development line of Soviet motor torpedo boats. Names in bold refer to series production types. (Drawing by Jerzy Lewandowski)

of the Volga, was intended to secure the transfer of small craft between the Far East and the Baltic, Arctic and the Black Sea. In practice, all these possibilities proved tactically worthless because of the time and effort – although the latter hardly mattered in Soviet reality – necessary to conduct such operations, while their strategic influence was restricted by the limited capacity of the boats. Incidentally, the whole concept of railway transfer of MTBs forced a width limit of 4 metres, which proved a serious design constraint affecting all Soviet designs from the 1920s. Only experience with the Lend-Lease Vosper, Elco and Higgins designs opened the eyes of Soviet decision-makers and designers, which resulted in successful post-war development.

The new Soviet design of Bolshevik-class wooden-hulled, wide-beam MTBs was practically a copy (albeit with a four-shaft diesel power plant) of the US Lend-Lease Elco 80ft boats, the assembly of which was done at the NKVD's Works No 5. The design coded Project 183 (NATO designation P-6) was prepared in 1949 by the OKB-5 (Special Construction Bureau) *sharashka* of Works No 5 of the NKVD. The chief designer was Pavel Gojkis, who experienced a death sentence in 1931 that was changed to

imprisonment in a *sharashka*, being released in 1932 to work at large, then jailed again in 1938 and released after ten years to manage the project designed by his colleagues in detainment. A total of 674 boats of all design modifications were built in the Soviet Union between 1949 and 1960, leaving Tupolev's duralumin-concept boats unsurpassed in terms of numbers.

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Title page image: see p. 15

Dedication

To Dagmara, my daughter and fellow writer.

Specifications key abbreviations

mcr = maximum continuous rating

oa = overall

pp = between perpendiculars

wl = waterline (measured on a waterline)